

# SUPPLEMENT.

## The Mining Journal, RAILWAY AND COMMERCIAL GAZETTE:

FORMING A COMPLETE RECORD OF THE PROCEEDINGS OF ALL PUBLIC COMPANIES.

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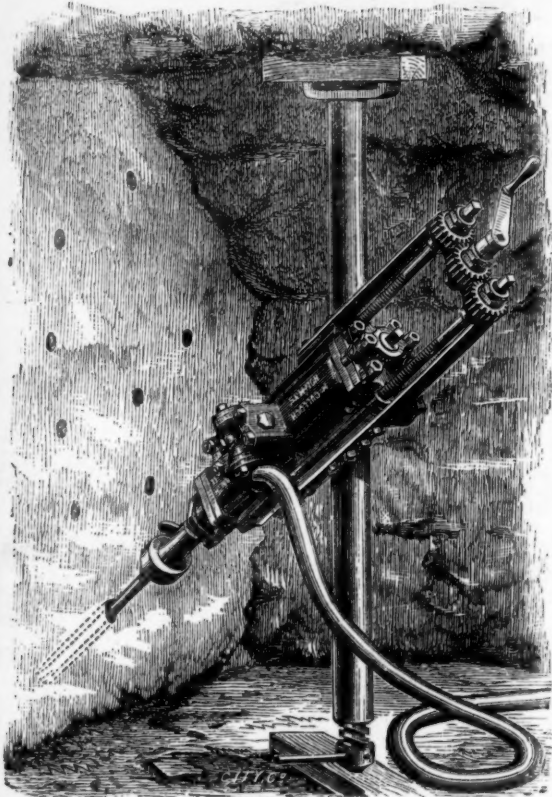
No. 2505.—VOL. LIII.

LONDON, SATURDAY, AUGUST 25, 1883.

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FIRST SILVER MEDAL, ROYAL CORNWALL POLYTECHNIC  
—Highest Award for Effectiveness in Boring, and Economy in  
the Consumption of Air.  
JUBILEE EXHIBITION, 1882.  
THE PATENT

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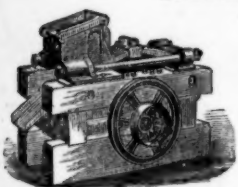
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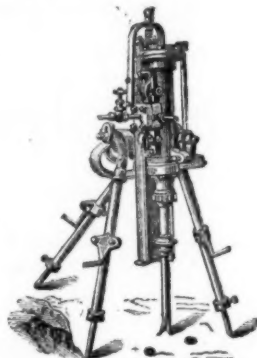
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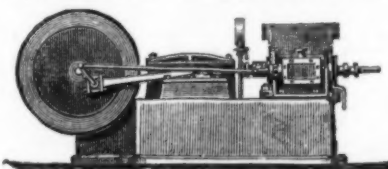
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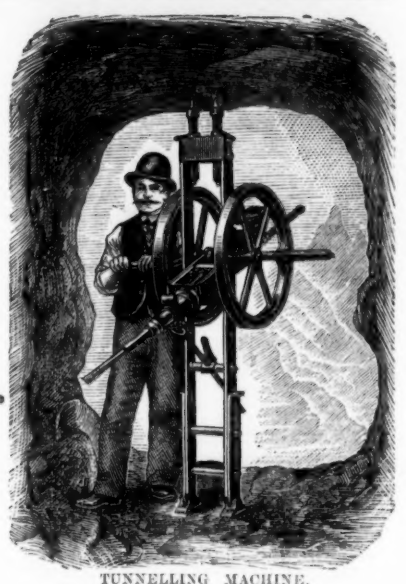
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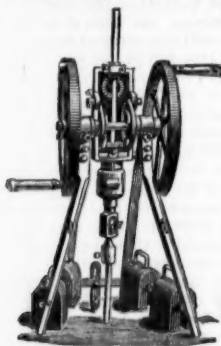
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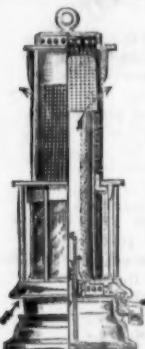
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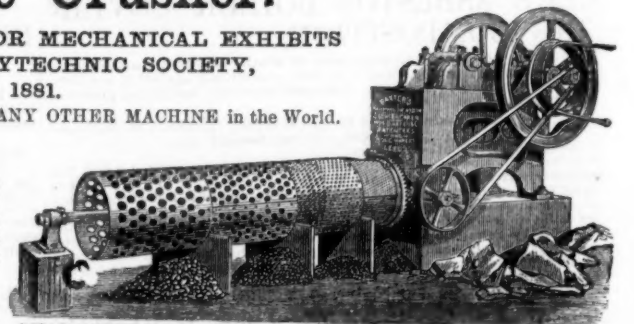
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Yours truly, E. ORGAN.

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Mr. John Bell, Asbestos Works, London.

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For Coating the Boilers of every kind of Marine and Stationary Engine. It is non-combustible, and can be easily and quickly applied at any time whether steam is up or not. It adheres to iron and metals and preserves them from rust.

The Maxim Weston Electric Company (Limited), 29, Bankside, London, S.E., 4th January, 1883.

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DEAR SIR,—In answer to your request, I beg to inform you that I find the thermometer placed 3 feet above the boilers now stands at 93°; before your covering was put on it used to stand at 126°. With regard to the saving in fuel I am unable to speak very accurately, as the boilers were not working long enough before being covered to ascertain the amount of fuel that would be consumed in an ordinary run; but I feel quite justified in saying that we burn less by about 5 cwt. per night than we were doing, and I shall be glad at any time to show the boilers to any one who may wish to see them, as I consider yours the best covering that I have up to the present seen.

Yours faithfully, (Signed) J. H. CUNDALL, Works Manager.

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The engineer of a world-renowned firm writes:—"There is not, nor can there be, any doubt as to the excellence of your Asbestos and India-rubber Woven Sheet—as a jointing material it is unrivalled."

The engineer of a large colliery writes:—"I would in all candour say that your Asbestos and India-rubber Woven Sheet is first-rate for joints. In my 25 years' experience I have not seen anything like it. I highly recommend it to all those who have to do with steam engines."

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Yours truly, W. WILLIAMS.

## BELL'S ASBESTOS YARN AND SOAP-STONE PACKING,

For Locomotive Engines, Cranes, &c.

The following Testimonial refers to this packing:—

Festiniog Railway, Locomotive Superintendent's Office, Portmadoc, Jan. 13th, 1883.

Mr. John Bell, 118, Southwark-street, S.E.

DEAR SIR,—I have much pleasure in saying that the Asbestos Yarn and Soapstone Packing gives every satisfaction; indeed, better than we expected. We have a locomotive packed with it, and has been running five months (and think of the piston speed with our small wheels). I think the Soapstone a great improvement, as it keeps the packing elastic, and prevents it getting hard. I am very pleased with its working, and also the very low price for such good lasting packing. The Asbestos Yarn we find is very useful, and answers admirably.

(Signed) Yours truly, W. WILLIAMS.

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John Bell, Esq.

SIR,—I have great pleasure in reporting on your Asbestos Cloth Rope Packing which you sent me on trial. I tried it in one of two H.P. Piston Rods, and it ran 90 days without repacking. The other H.P. Piston Rod was packed with a similar form of packing, not composed of Asbestos, and was repacked 10 times during the 90 days. I have recommended it both at Sydney and Melbourne, and shall do my best to take this packing in whatever steamers I may have to do with.

I remain, Sir, yours truly, W. W. PROPHET, Chief Engineer S.S. "NORFOLK."

## BELL'S SPECIAL LONDON-MADE ASBESTOS MILLBOARD,

For Dry Steam Joints, Electric Dynamo Machines, &c.; made in sheets measuring about 40 inches square, from 1-64th inch to 1 inch, and ½ millimetre to 25 millimetres thick. Each sheet bears my Trade Mark, without which none is genuine.

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For Fire Escapes and Window Sash Lines, &c.

## FOREIGN MINING AND METALLURGY.

The French Iron Trade has shown a somewhat better tendency. The approval given by the French Chamber of Deputies to the conventions recently concluded with the six great French railway companies by the French Minister of Public Works is expected to produce an immediately favourable effect. The foremasters of the Nord had decided to work only five days per week, so as to restrict their production. Some of them are now compelled to begin working on Mondays, and it is concluded from this that, although orders are still not very abundant, a rather sensible improvement has, nevertheless, taken place in affairs. There has been at present, however, no improvement in quotations. The general quotation for iron in the Nord has been 6l. 12s. per ton, but business has been done at 6l. 8s. per ton. At Paris iron merchants are still discouraged by successive reductions in prices. A contract for iron fish-plates has just been let by the Northern of France Railway Company at 6l. 7s. 2d. per ton. The Commentry Forges, the Navy Steel Works, and the St. Etienne Works have just received important orders for mixed iron and steel armour-plates from the French Minister of Marine. The total amount of these orders is about 200,000l. There is little improvement to report in the general tone of the German iron trade. Quotations have been rather feebly supported for most descriptions, but we learn from Westphalia that a fair amount of business has been passing of late upon the Westphalian markets. This may be accepted as an indication that purchasers consider that the downward tendency in prices has reached its ultimate development. The demand for puddling pig has become rather more active; and the enquiry for Bessemer pig and casting pig, if not active, is at least regular. Spiegel pig, on the contrary, has suffered from the meagre demand prevailing on export account. The improvement recently noticed in bars has scarcely continued. Plates have shown a fair amount of activity. The relatively satisfactory aspect of the iron trade in Austria and Hungary has induced some firms to attempt to advance the rates current for iron for building purposes; their efforts have not, however, been a success. Plates have shown a firm tone in Austria and Hungary, but remain at their old rates.

The Belgian Coal Trade has shown no increase of activity. Some descriptions of coal in the Charleroi basin have, however, been firm. Coke has left a good deal to be desired. Business has been done at 12s. to 12s. 6d. per ton, but producers have, at the same time, maintained an attitude of reserve, so that they appear to have some confidence as regards the future. In the week ending Aug. 12, 16,667 trucks carrying coal and coke passed over the Belgian State Railways, as compared with 16,374 trucks in the corresponding week of 1882. The average load carried by each truck was 10 tons. The imports of coal into Belgium in the first six months of this year amounted to 583,663 tons, as compared with 440,905 tons in the corresponding period of 1882. The imports of coke in the first six months of this year were 9798 tons, as compared with 8774 tons in the corresponding period of 1882. The total of 583,663 tons representing the imports of coal into Belgium in the first six months of this year was made up as follows:—Germany, 212,685 tons; Great Britain, 138,371 tons; France, 67,263 tons; the Low Countries, 165,141 tons; and other countries, 203 tons. The exports of coke from Belgium in the first six months of this year amounted to 530,958 tons, as compared with 934,370 tons in the first half of 1882. Of the coal exported from Belgium in the first half of this year, 1,873,729 tons went to France, and of the coke exported from Belgium in the first half of this year 463,071 tons were forwarded to the same country. The tone of the French coal trade is considered to have slightly improved, and an upward movement has taken place, especially in the Nord and the Pas-de-Calais; this upward movement appears to be attributable to an advance in certain descriptions of coal in Belgium. Coal has been in good demand in Germany. The enquiry for coke, on the other hand, has been comparatively feeble. The production of the Sarre basin in July was 478,041 tons, as compared with 461,701 tons in the corresponding month of 1882.

The Belgian Iron Trade remains in much the same state. At Charleroi iron has shown some firmness. English pig has been a little weak upon the Belgian markets, at 2l. 12s. 6d. per ton, or about 6d. per ton lower than last week. Belgian casting pig has been quoted at Charleroi at 2l. 18s. per ton, and Belgian refining pig has made 2l. 4s. per ton. No. 1 iron still maintains a basis price of 5l. 4s. per ton, but business could be done at 5l. 2s. per ton. A lot of 50 10-ton wagons for the Belgian State Railways has been shared between the Baume-et-Marcup Works and M. Germain, of Charleroi, at 5486l. Another lot of 50 10-ton platform wagons, with Stilman brakes, has been taken by the Dyle-et-Bacolan Company, at 4442l. The imports of iron minerals into Belgium in the first half of this year were 767,836 tons, as compared with 592,853 tons in the corresponding period of 1882. The exports of iron minerals from Belgium in the first half of this year amounted to 218,001 tons, as compared with 164,631 tons in the corresponding period of 1882. The imports of steel rails into Belgium in the first half of this year were 37,040 tons, as compared with 31 in the corresponding period of 1882. The exports of steel rails from Belgium in the first half were 448 tons, as compared with 31 in the corresponding period of 1882. The imports of iron rails into Belgium in the first half of this year were 5078 tons, as compared with 10,405 tons in the corresponding period of 1882. The exports of iron rails from Belgium in the first half of this year amounted to 80 tons, as compared with 36 tons in the corresponding period of 1882. The imports of plates into Belgium in the first half of this year were 28,781 tons, as compared with 19,060 tons in the corresponding period of 1882. The exports of plates from Belgium in the first half of this year amounted to 358 tons, as compared with 575 tons in the corresponding period of 1882.



## Original Correspondence.

## MINERAL RESOURCES OF CANADA.

SIR,—I have from time to time read with much pleasure the communications of your correspondent, "Bourbonite," with reference to Canadian mining matters, and should like to add a few observations of a more practical, though probably less interesting, character to show what is really doing. As I have not yet entered upon the engagement I am about to fulfil I cannot at present do more than give an outline of the published statements, so far as they appear reliable, but at a future time I may give something more concerning individual mines. Although comparatively young as a literary production, I think I am fully justified in saying that the Canadian Mining Review, published in this city, is the best newspaper of the class to be found here. Recognising the fact that mining in a district where there are no facilities for getting away the ore, or getting up the necessary machinery and materials is a very thankless task the Editor properly directs prominent attention to Projected Railways to penetrate Mineral Sections of Canada, remarking that during the last session of the British Columbia Legislature a bill was passed incorporating the Kootenay Railway and Transportation Company, and donating 750,000 acres of land to its promoters, including all mineral lands other than gold or silver. This railway will penetrate a section of the province known to be rich in mineral and farming lands, and the only reason why it has been neglected heretofore has been its inaccessibility.

The object of the railway is to connect Kootenay Lake with the navigable waters of the Columbia River, and to act as a feeder to the Canada Pacific Railway. That the company's charter is a very valuable one it is admitted on all sides, but the fact that the land grant and franchise have fallen into the hands of Americans has created much local dissatisfaction, so much so that on April 23 a public meeting was held in the City Hall, at Victoria, B.C., for the purpose of considering the grounds upon which exception was taken to the passing of the Act of Incorporation. The meeting was largely attended, and resolutions then passed were submitted on April 28 to the Lieutenant-Governor for transmission to Ottawa. The meeting protested against the Act of the Local Legislature, and invoked the invention of the Dominion Government. Since then the matter has been fully commented on by the Press, one journal going on so far as to state that the charter had been disallowed. That this has not been done is apparent by the fact that such disallowance has not appeared in the Canada Gazette. The resolutions referred to, and many communications in connection therewith, have been received by the authorities at Ottawa, and the matter has been reported on by the Minister of Railways and Canals and the Government Chief Engineer, but no action has yet been taken. It is not in the least improbable, however, that the Minister of Justice who, with the Government Engineer, has proceeded to British Columbia on public business will, while there, discuss the question at issue with the local authorities, and it may result in certain features, objectionable in a Dominion point of view, being eliminated from the bill during the next session of the Local Legislature.

That the construction of this railway will be a boon to the Kootenay district, and of much benefit to British Columbia, is acknowledged on all sides, and it is universally admitted that the Local Legislature has been most generous to the promoters in granting them the franchise and in its land subsidy, but it would seem that the greatest grievances the petitioners have, exists in the fact that the successful applicants are Americans. It appears that these gentlemen are personally interested in the development of the district into which the railway will penetrate, having become owners of the largest deposits of silver-bearing galena yet discovered on the Pacific Coast, situated on the east side of Kootenay Lake. Therefore, nothing is more natural than that they should seek substantial Government aid to enable them to open up a section of country in which they are so deeply interested. The company to construct the railway has been organised with \$5,000,000 capital stock, divided into 75,000 shares of \$100 each; \$4,000,000 has already been subscribed, and the balance will be allotted in California.

That it would have been preferable that the capital for constructing the line should have been provided either by the Canadians or by the British cannot be doubted, and I feel convinced that had a full prospectus been issued in London the necessary funds would have been obtainable upon easier terms. The Canadian Mining Review further states that the contract for the construction of the Ottawa and Gatineau Valley Railway has been awarded to Messrs. Macdonald, Bray, and Jones, of Toronto, and work will proceed about the first week in August, the entire line to Desert to be finished within three years. The Ottawa Colonisation Railway will be under construction within a few weeks, and vigorously prosecuted thereafter. The company, it is remarked, of course depends upon the active assistance of property owners and taxpayers, and after making the regular location survey will ask the townships to manifest their desire to get a railway by granting small bonuses, and the property owners to grant right of way. We would urge every public spirited ratepayer to work indefatigably in the interest of the enterprise, as it will be the making of this portion of the country. We congratulate the promoters of the railways upon the progress already made, and feel confident that success will crown their efforts.

The Lake Winnipeg and the Keewatin Gold Mining Companies have recently obtained their charters from the Manitoba Legislature, and steps have already been taken to obtain machinery and miners. The Lake Winnipeg Company's mine is situated on the Big Black Island in Lake Winnipeg, about 75 miles north of the mouth of Red River. The island is about 9 miles wide and 13 long, and the Saskatchewan steamers pass it regularly on their route, thus affording easy communication with Selkirk via the branch of the Canadian Pacific Railway from Colville Landing. The company began work last fall, and have sunk a shaft to a depth of 56 ft., all the way through "pay rock." Operations have not yet gone far enough to enable a calculation to be made of the probable extent of the lode, but where it crops out at the bank it is about 20 ft. deep. The company intend to sink another shaft further back, to strike the lode about 200 ft. below the surface. The assays which have been made of ore yielded from \$90 to \$150 of gold per ton; a single very rich specimen gave \$300 per ton. The ore will have to be reduced by what is known as the "washer" process. There is some free gold in the mine, but a great deal is refractory ore.

The Keewatin Company's Mine is on Hay Islands in the Lake of the Woods, 9 miles south of Rat Portage, where the Canadian Pacific Railway touches the lakes. This is one of the richest mines in the Dominion. There are at least some thousands of tons of ore right inside of it. It crops out of the side, and you can hardly pick up a piece of stone but you can see free gold in it. The lode can be traced for about half a mile very plainly. About 1000 ft. from these croppings the company have sunk a shaft 62 ft. deep, and the ore looks better the deeper they go. This can be made a paying mine right away, and it is intended to put up the mill the first thing, as soon as it reaches the place. The company expect to pay a dividend on the first operations, besides paying all the expenses of working the mine. It is hoped that the mill will be running in the course of three or four months from now, everything else being ready for operations, about 400 tons of ore having already been taken out.

The only obstacle in the way of the speedy and extensive development of the mineral resources of Manitoba is the lack of confidence on the part of the men who have the money to invest, and that is a serious difficulty. A great many persons speculated largely in land during the great boom about a year and a half ago, and many of them were badly bitten too. The capital invested in this way is now looked up, whilst those who have available funds are afraid to invest them. There is a great deal of the country yet unexplored, which it is believed will yield immense mineral wealth. The native Indians are continually bringing in specimens of gold and silver ore astonishingly rich; but they cannot be induced by any means to tell where the ore is taken from. It is, no doubt, somewhere between Lake of the Woods and Lake Winnipeg. The country is now being slowly explored, and shows a large mineral belt. The other mines in Manitoba already in operation are in a prosperous condition, and

their owners seem confident of success; all they want is capital to develop them.—Ottawa, Aug. 1.

MIC MAC.

## AMERICAN MINES, AND BRITISH INVESTORS.

SIR,—My attention has recently been called to the subjoined paragraph in the *Mining Journal* of June 30:—

A correspondent—"J. B. R." Oriental Club, Hanover-square—forwards the subjoined extract from the *New York Daily Stockholder* as likely to be of interest to capitalists:—"Parties now in England are trying to negotiate the sale of certain copper prospects located in the peninsula of California, about 80 miles across the gulf of California from Guaymas, Mexico. These prospects have repeatedly been offered to Americans for merely nominal prices, as often tested and found worthless. The Leadville engineer now reporting this property favourably is the party who last year reported the Longfellow Copper Mine of Arizona favourably for a contingent interest in the profits of its sale, and his partner is trying to negotiate this sale. English and Scotch capitalists are disposed to look kindly on American investments, and it is to be hoped that they will not again be victimised. There are legitimate mining enterprises in America inviting foreign capital, and the presentation of such frauds as the above causes distrust in the minds of capitalists and tends to throw suspicion on enterprises that are meritorious."

In its general tone and in many of its statements the article is untrue. I presume this is due to no desire on your part to injure any honest property or persons, and, therefore, I offer you the opportunity to investigate the circumstances, to form your own opinion of them, and to rectify the wrong you have done by correcting the statements through your own columns if you satisfy yourself that the quotation from the *Stockholder* is false. Had you not assumed the responsibility of republishing the statements, I should, of course, not ask your time to investigate their truth, but there seems to me now to be an obligation on your part to ascertain the real facts.

I am the partner of the Leadville engineer who reported on the properties referred to, and on the Longfellow Copper Mine of Arizona, and submit the following:—1. I offered for sale in England certain copper mines in Lower California, 60 miles across the gulf from Guaymas. These mines were not prospects, but have been steadily and profitably worked for over 10 years, and their total product sold by London merchants. They were not offered to Americans at low prices, nor were they ever tested with adverse results. —2. My partner did not report for purchasers either upon these properties nor upon the Longfellow. He did prepare reports to be used as vendors' statements, and the mines were offered for sale subject to verification of these reports at my expense by purchasers' engineers. He openly assisted in the offering for sale of the properties, and was known to be interested in the result as my partner.

If I hear from you that you are willing to do justice in this matter through the columns of the *Mining Journal*, I will submit the proofs of my assertions to you in London, and refer you to gentlemen there of unquestioned standing and responsibility, who will verify each item.—*New York City*, Aug. 10.

FRANK M. TAYLOR.

[We shall have much pleasure in giving our best attention to all documents bearing upon the question that may be submitted, and will find space to publish all that is necessary to enable the readers of the *Journal* to form their own judgment.]

## INDIAN GOLD MINES, AND SHAREHOLDERS' DESPAIR.

SIR,—In my letter of Feb. 21, in which I referred to economical mining, as practised here in Victoria, I gave an example in detail of an auriferous quartz reef (lode) yielding for half a year 3 dwts. 5 grs. of gold per ton, and paying monthly dividends of 1s., and one of 1s. 6d. on 10,000 shares, and I am induced to send a few other notes relating to gold mining that I think will at least prove interesting to many of your readers, and of some practical value to those interested in new gold fields in the early stage of development. Gold assays of samples taken from a quartz reef are of little or no value (the latter as a rule) in affording even an estimate of the richness of the reef. The assayer, however correct he may be to decimals in his report, has simply given the result of what was placed in his hands, and he cannot be held responsible for doing more than giving a correct report. He cannot say that the whole of the quartz reef is equally rich, but his certificate of assay looks well in a prospectus, and carries, probably, greater weight with the outside public than it deserves. Assays are of great utility in testing the value of the waste tailings, as showing what gold the crushing-mill and amalgamators are losing; and, properly speaking, such tests should be applied to every quartz crushing establishment daily—i.e., samples should be taken daily, thoroughly mixed, re-sampled, and (say) one assay per week made.

The details of sampling will vary in each mine as do the contents of the reefs or lodes. Even did assays tell one correctly the golden contents of a lode it does not follow that all this gold can be extracted on a large scale. The result in gold got from a ton of quartz in a prospectus is of no more value than an assay of a few ounces of quartz—the one can be a picked rich lot as much as the other. The proof of the richness of a quartz reef is got from the crushing battery, through which some hundreds or thousands of tons of quartz taken from the reef have been reduced and the gold extracted. A rich specimen of golden quartz may get into even a ton of quartz and increase its richness by pennyweights or ounces. Gold often occurs in isolated patches. Only last week whilst I was inspecting a quartz claim (mine), in examining the waste heap round a shaft which had been sunk through a network of quartz veins, the first specimen of quartz I picked up contained four or five big and small splashes of spongy gold that had been washed clean and sparkling by the previous night's rain, but I searched in vain for another colour or speck of gold.

This is not at all an uncommon occurrence, as a tiny thin vein will sometimes carry gold, whilst those surrounding it are barren. My motto is "stick to the gold," especially in Upper Silurian rocks, as the thin vein, or lode, as we often here call it, leads frequently to the larger deposits. You see, Sir, that it is quite possible for the public to be misled unintentionally by inexperienced men or miners; but persons claiming to be experienced gold quartz miners who trust to assays to supply them with a satisfactory proof of the richness of a quartz reef, and of its payable character, must be either charlatans, rogues, or fools.

You cannot trust the returns of gold from a crushing battery at all times, for one crushing of 100 or more tons may work out a "shoot of gold," or, as the Californians term it, "pay chimney," and another one might not be found for hundreds of feet. So far as reports on distant gold mines are concerned (just like mining in other metals or minerals), faith must be placed in the honesty, experience, and judgment of the writers, bearing in mind that no man can see through an inch of ground or can make gold. Too much is often expected of experts; they may report honestly enough, and according to their convictions, that a mine is a good one for investment, but the public must know this is not an infallible guarantee that such shall be the case. The expert has spoken from his observations, past experience, and the best of his knowledge. The best measure I can suggest to check an expert employed by the vendor of a gold mine is for the vendee to get a report from another expert, whose services are paid for by themselves. No expert who esteems his own good name and integrity but would be delighted to be so checked, as this action would relieve him of great responsibility, and set doubt at rest so far as his character is concerned.

It is not uncommon for a professional mining engineer who has reported favourably on a mining property to see a good venture spoiled subsequently by bad management, and to note his character and reputation injured through incompetent, lazy, drinking mining managers, not averse to joining a ring to rig the market. Every engineer of experience must at some time in his career have had to look on and see his reputation, at any rate, partly, in such hands, and his feelings can be better understood than described. It sometimes happens that such managers have great influence, and cannot be removed until the property has obtained a bad name, and all those connected with its inauguration as a mining company likewise suffer. Such managers as I have just referred to cannot find steady employment in centres of civilisation, and prefer to mismanage mines at considerable distances from directors and away from control. I am glad to say, however, that splendid mining managers are to be got, although it is often very difficult to get them to go to rough and distant places, leaving their families and congenial society behind them.

With regard to payment of directors, which subject I referred to

in my last letter to you, Sir, I observe that in more than one case the directors of Indian companies have not drawn their fees. Such being the case, I think they might reasonably ask their mining managers to consent to a reduction of salary, and in lieu thereof offer them a good bonus with each dividend, or a small percentage on the profits made each month, or a resumption of present salaries with the first dividend. In progressive mines I prefer the bonus or percentage, as this will give the manager greater pay and greater inducement to strain every nerve to obtain that pay. At the present time it matters little to the mining manager whether the mine pays or not, as his salary remains the same. This state of things does not conduce to fetch out his brain power, or cause him to plan out each evening the work of the next day—for conscientious managers do so labour. As men are constituted differently so will they work; but, speaking generally, a bonus or percentage unmistakably promised will give the required impetus.

If with reduced salaries, and a comparatively considerable bonus or percentage on dividends or profits, the managers do not consider the prospect sufficiently good to retain their positions, then their faith in the mines cannot be very great. The men that have good mines, or believe they have, will see a chance of benefiting themselves as well as the shareholders by extra exertion, and will be willing to accept this change of pay because they can see an opportunity of making more money than they otherwise could do on regular salaries. I must not spin out my letter longer; as it is I have not written on the subjects I proposed to myself when I began—a few notes on practical gold mining. As I am now off on an inspecting tour for a month or more time into the interior, I must try and send you those notes on my return.

WILLIAM NICHOLAS, F.G.S.

Exchange, Melbourne, June 29.

## MINING NOTES AND RECOMMENDATIONS.

SIR,—History says that the Gold Coast acquired its name "from the immense amount of precious metal which it produces," tradition repeats the assertion, and fact supports it. The date of the discovery of the Gold Coast is not satisfactorily settled, and perhaps never will be, the dispute lying between the French and the Portuguese. Villante and Rabbé say that the coast was known to the French 100 years before the Portuguese began their work of discovery. These writers do not agree in the date, the former fixing the discovery at 1346 and the latter 1364. The writers in question say that Elmina was the first place touched, and the name was given because of the gold existing in the immediate vicinity. A factory was established, 12 men being left in charge. The colony had so increased that in 1387 a chapel was built, and the trade flourished until 1413, when the wars of France diverted the attention hitherto given, and the colony fell into decay. Elmina was eventually abandoned, and so with other places on the coast.

Where all this was gleaned from it is impossible to say, as the best writers and historians make no allusion to this affirmed discovery. Not only are the great French historians silent on the matter, but none of the Portuguese refer to the French discovery. At so early a time maritime expeditions would have commanded universal attention; for, at a considerably later period voyages of discovery were looked upon as little less than miracles. When Nany Azambuja undertook the work of fortification, in 1484, he must have been ignorant of any fort having been built there, as he makes no allusion to it. This unauthenticated record is stated by later writers to be the work of imagination, which a national pride had prompted. The discovery of the Gold Coast was generally ascribed to Portugal, and this appears but reasonable. Don Henry, the son of the King of Portugal, served under his father at Ceteca, and while there he acquired information from the Moors of the inhabitants of the West Coast of Africa. The Moors were thoroughly well acquainted with the tribes of these regions, as far down as Guinea, and it is believed that the first thoughts of maritime discovery were enkindled in the breast of the young duke by his contact with the Moors, and his desire of finding a way by sea to those countries from whence they brought gold across the desert.

It is not unreasonable to suppose that he heard many stories of treasures in far-off lands, and, doubtless, he would hear of the sea beyond Southern Guinea, which would suggest the possibility of their being in some way connected with the seas of which he was already acquainted. Anyhow, the Duke of Fisco had now but one purpose, and that was to find these rich lands. In 1412 the Duke of Fisco sent out an expedition to explore the West Coast of Africa, the first of Portugal, and, perhaps, of any other nation of modern times. Very little progress was made. Navigation was not well understood, and maritime knowledge generally was of a most limited character. Filled with fear these early voyagers dared not venture out of sight of land, and this mild spirit of adventure continued from year to year. Those days, too, were times of great superstition, and the legends of the ancients lost none of their ugliness as they were handed down generation after generation. Indeed, it is not at all unlikely that slight additions were made, seeing that Europe was in the hands of those who were ever ready to take advantage of intellectual darkness. The torrid zones conveyed to these people the idea of burning sands and scorching mists and vapours, so that it cannot be wondered at that they could only summon sufficient courage, which enabled them to creep along the coast year by year.

Reports were not the most favourable which the young duke received, but, whatever their character, he never wavered from his purpose, and, if anything, applied himself more diligently to unravel the mystery which lay beyond. He applied himself to scientific studies, and with a laudable energy and zeal encouraged the study of astronomy and navigation, and brought men of science from other lands to teach in a school which he established for this purpose. The greatest opposition was shown to this enterprising spirit in his great work, envy, no doubt, doing much to mar the noble efforts put forth. Contrary opinions to his own were utterly disregarded. Books and men had convinced him that he was right, and his purpose was, therefore, unchanged, and he continued the work which he had taken up. In the year 1442, after many disappointments, Henry's sailors first saw gold at the River Grande. The news caused considerable stir and excitement in Portugal. Soon after this a trading company was formed, but no important advance or discovery had been made at the time of Henry's death in 1463. Cada Mosta, who served under Henry, states that large quantities of gold had been received from the coast of Guinea as far back as 1453, but there is nothing to support this. It was not until 1471 that the Gold Coast was discovered.

In 1481 John II., of Portugal, sent out 10 caravels, and these conveyed 500 soldiers and 200 mechanics, and also materials, fully prepared for the erection of a fort. Nany Azambuja was at the head of the expedition, and on arriving at Elmina he met the king with great pomp and ceremonial, so that he might create on the native mind a great impression as to the importance and dignity of the King of Portugal. The king was no less backward than Azambuja, and did his best with a large display of men and gold to show himself off. After considerable hesitation the King of the Gold Coast consented to the erection of a fort, and the next day the work was begun. The stone was hewn from a neighbouring quarry, and parts of the structure having been brought ready-made, needing but the fixing together, great expedition was shown in furthering the work. Within a month the fort was so far advanced that it was in a state of defence. The natives, seeing the strong buildings arising in their midst, objected to their continuance, but were appeased by the presents which were made by the Portuguese.

Portugal had now gotten fame in Europe, for the news quickly spread of the great acquisition made by John II., who proud of what he had done, assumed, in addition to his own title, that of Lord of Guinea. Azambuja returned loaded with immense wealth. Everything was done to keep up the royal monopoly, and the Portuguese, having now a good footing, were not slow in representing to the natives of the Gold Coast that all new comers than themselves were nothing but cut-throats. In what way the native mind received such statements it is difficult to divine, for it is well known that the Portuguese treated the natives with the greatest cruelty, and this is not at all surprising when it is remembered that colony was largely composed of the riff-raff of Portugal. Those criminals who were thought hardly deserving of the gibbet were sent to the Gold Coast



to do duty for the king. As other nations began to make themselves felt on the Coast, the persecution of the natives became worse and worse. All communication with the French and others, even of their own nation, was prohibited under the penalty of fines and imprisonment.

The extreme penalty of the law being carried out in the most cruel and barbarous fashion, large numbers of the Dutch, French, and English were brutally murdered in their endeavour to make a trade, and Portuguese private traders faring the same fate. Our own King Edward IV. was prevented from sending out an expedition because it was shown that the Pope had given special titles to the King of Portugal. Ten years later, 1553, the English sent out an expedition under Windham and Pintada, but it came to nothing through the tyranny of Windham, and great suffering and loss of life was caused by him. From 1553 to 1558 expeditions were sent out yearly by the English, and in these six years about 120,000*l.* in gold was brought home. It was not long after this that the Portuguese lost their position on the coast, having received from the Gold Coast 2,000,000*l.* in gold.

E. R. GABBOTT.

#### BRAZILIAN GOLD MINES.

SIR,—In last week's *Mining Journal* appears a letter from your correspondent "Minas," dated July 9. In discussing the various mining enterprises in that country he incidentally refers to the property worked by the Brazilian Gold Mines Company, and says—"Descuberto with 'pounds of gold in the safe' (so I see by report in the *Mining Journal*) is still dragging on, but with no better prospects." On reading this report immediately occurred to my memory of the general meeting of the Brazilian Gold Mines Company, which took place last March, when Mr. John Lean was discredited for no other reason, as it would now appear, than that he had written a trustworthy report. My object, however, in addressing you is not to defend Mr. Lean, but to ask what is now the state of affairs? "Minas" says—four months after the last meeting—that they are "still dragging on with no better prospects," and it is not a fact that the manager's reports since the beginning of the year have shown that the produce of the ore has diminished rather than increased? If this be so, and if not some one in authority will no doubt readily set me right, it is evident that the mine is not paying its own expenses, and, therefore, it is impossible that it can be carried on much longer without additional money. Hence I am afraid that the shareholders are a long way from the realisation of their hopes—i.e., a dividend!

JERVAS.

Great Winchester-street, Aug. 23.

#### MINES DUES AND LEASES.

SIR,—Whilst closely watching the *modus operandi* of the Cornwall Mining Institute in dealing with this all-important question I have refrained from writing upon it until I had seen their programme. I cannot congratulate them in their present stage, as I am doubtful that the whole affair would have collapsed only for Mr. Symons (who contains 50 per cent. of the known intelligence of the Institute). It is strange, passing strange, to me how indifferent miners appear to be in this matter, whether out of fear or what I cannot say. The members of the Institute are the *ecclat* of mining, the "gems" of the county, and from a careful perusal of their transactions at the last meeting a little polishing might possibly brighten some of them up.

The question of mine dues and leases is one that ought to be taken up by every miner, and receive their undivided support towards bringing about "a consumation devoutly to be wished for"—a change in the existing laws relating thereto. No pessimists' views or half-measures can be entertained in the operation; in whatever shape or form the question is brought before Parliament it must be drastic, or for ever let it pass into oblivion. What speculating miners want is not war with the lords, but protection from fines for the renewal of leases; and, as Mr. Symons puts it, "high dues, high rents, exorbitant charges for land," &c. The lords must admit that the miner has tamely submitted to this tyrannical treatment long enough, and now the present state of mining compels him to seek redress through the Legislature. I cannot agree with the Chairman of the Institute that there is a difficulty to bring about this much needed change. The question to me lies in a nutshell—the rights of the speculators in their capital must be placed on a par with that of the rights of the property of the lords. Can anyone point out the unreasonableness of this demand? and the Legislature is the only source from whence this can be accomplished.

This grave matter, affecting as it does the whole of the great industry of mining, ought to be calmly but fearlessly discussed. Mr. Teague, jun., stated at the meeting "that they had no grievances to complain of with the mines with which he was connected." Although this statement, which is most decidedly an exception to the rule, is cheering, it sounds rather selfish if the inference to be drawn here from it is that because such is fortunately the case, those who are not in the same position may take their chance.

Mr. Teague also stated that the Dolcoath affair was not for the Institute to discuss, for the foolish reason that it was a private matter between the lord and the adventurers in that mine. I consider this very weak coming from such an authority, as the same might be applied to every such case in any other mine. I can well understand the cause of Mr. Teague's delicacy after the reduction of dues he has recently had at some of his mines; but in the midst of all this he must not forget or ignore the general welfare of the community to which he belongs, and the industry which has made him what he is. The copy of the preamble of the bill to be submitted to Parliament, in the *Mining Journal* of the 18th inst., as drawn up by Mr. Symons, is worthy of the man, and although I do not believe in it in its entirety, I consider the greatest praise is due to him for the great tact he has displayed in its composition. Other letters to follow on this subject.

W. NIXESS.

Ferranporth, Aug. 23.

#### SCIENTIFIC MINING.

SIR,—About two months ago, I received from a gentleman—a successful speculator in mines—the following letter, which probably would interest your readers:—

"Dear Sir,—A friend affords me an opportunity of seeing certain contributions of yours to the West Briton, which I peruse with interest. It, however, occurs to me that a main point—in short, the lesson which the county at this time especially needs—is omitted. Take, for instance, my friend Joseph Lyle, of Bonython. The providence of God raised up that man just at the juncture of the county's need. A friend of mine lent him money to go to London to bring out Carn Brea (but do not mention his name). My point is this, and I speak from a perfect knowledge, that he, after examining the backs of certain lodes, saw in this blossom on the tree (as it were) the evidence of fruit beneath. His belief was never mixed with doubt. I speak of the period prior to the discovery of the ore. His expectations were fully realised. There is this singular tribute to his management, that no copper has been discovered in paying quantities since. He thoroughly developed the mine, and exhausted it of copper.

"Again, he saw a stone in a hedge; he enquired where it came from. The person who built the hedge told him. He examined the spot; saw the back of the lode, took up the sett, and worked it as North Basset.

"Again, in West Basset he acted in a similar way; but perhaps the crowning fact of his insight was shown in Great South Tolgus, which was about to be abandoned. Capt. Simcock was the manager. He bought the mine for the value of the materials, drove a cross-cut a few fathoms, and came on a splendid course of copper.

"Wheat Kitty, in St. Agnes, is another. His brother John put on a variety of mines, but Joseph had nothing to do with them. What I wish to convey is this—that he believed in certain districts certain indications, like the blossom on the tree, give certain proof of a profitable return, if judiciously and economically worked. This belief has died out. I could fill a volume with facts in support of what I say. I want you, in referring to such men, not simply to say that they lived and died, but that, so far as this world is concerned, they lived to purpose. I write presuming that you know these things. If you do not, I will, when at leisure, epitomise a letter, which you can utilise."

Since the above letter was received the writer thereof has kindly sent me a much longer one, of which I hope to forward you shortly a copy for insertion. The name of the writer I am bound to conceal, but I may say that he is a highly respectable man. R. SYMONS.

Truro, Aug. 18.

#### LEVANT MINE, AND ITS MANAGEMENT.

SIR,—Having in my last letter referred to the heavy bank charge of 135*l.* 11*s.* 10*d.* with an overdrawn balance which at the last account was stated to stand at 1595*l.* 7*s.*, that with the former one representing interest and commission for the year of 20 per cent. on money borrowed, referring to Dolcoath, the richest mine in the county, it appears that 10 per cent. annually amounting to 1000*l.* a year is paid; whereas Levant for the nine years previous to the last, or an average annual bank debt of 1912*l.*, has paid 223*l.* a year, or 11½ per cent. This allusion to the influence of the banking interest on Cornish mines may now be associated with the position and character of one of our four committee men resident in St. Just—Mr. Richard Boyns, lately the agent of a well-known banking firm, who was likewise the purser of two other St. Just mines. I mention his name as he has thoroughly approved of Capt. Richard White's action towards myself in denying me the inspection of the mine-books, and in Capt. White's right to appropriate the surplus funds of the club money subscribed by the men; this practice is, it appears, not confined to Levant, consequently the management of the moneys of adventurers cannot be expected to rest on a satisfactory basis where such a fraudulent principle is admitted; in corroboration of which I would state that a Penzance merchant adventurer who formerly supplied Levant Mine with candles which he manufactured has recently been supplanted by Mr. Boyns, whose bill against the mine at the first meeting of his creditors, held last Friday, amounted to the heavy figure of 230*l.*, evincing that the committee of Levant, who have already cost the mine about 1000*l.* a year, by their superseding and doing away with a managing agent, and who are excused by some on the plea of ignorance, might be reasonably expected on the question of finance to curtail expenditure by checking merchants' bills, the charges on which they ought to understand, yet still further increase the burdens of the suffering out-adventurer.

St. Just, Aug. 22.

R. B. SEARLE.

#### DUES ON MINERALS.

SIR,—I see in last week's *Mining Journal* that a writer there thinks that the dues on minerals should not exceed 5 per cent. on the net profits. I saw a gentleman in Truro yesterday who said that he thought 10 per cent. would be fair. The last is, in my opinion, more fair than the first. Heretofore we have been paying 5 per cent., or more in many cases, on the gross produce. If we pay on profits only we should be liberal towards the lord. I have invited (in last week's *Journal*) suggestions on this subject.

Truro, Aug. 22.

R. SYMONS.

#### YEOLAND CONSOLS.

SIR,—As a shareholder in Yeoland Consols, I was pleased to observe in last week's *Mining Journal* the announcement of the first sale of tin by this company, as also the statement that the company have over 2000 tons of tinstuff ready for stamping. Recent reports of the property are most favourable, and the venture seems likely to turn out a real success.—City, Aug. 21.

T. W. M.

#### YEOLAND CONSOLS.

SIR,—I am pleased to learn from last week's *Mining Journal* that the Yeoland Consols have commenced sales of tin. Having been occasionally stopping in the neighbourhood, I have had the pleasure of calling at the works several times, and have heard the opinions of practical miners. They all confirmed each other's statements, that the company have a valuable property; and what we require now is the water-power for stamping and dressing the tin. Great credit is due to Capt. J. Manley (the agent) for his exertions, and the way in which he has conducted the working department and in bringing about the sale of tin.—Plymouth, Aug. 22.

H. W.

#### TANKERVILLE GREAT CONSOLS.

SIR,—No doubt great results may be expected at these mines under skilful, energetic, and frugal management, and I hope the affairs of the company will be conducted strictly in accordance with those principles. But since the amalgamation in the autumn of 1880 the expenditure has exceeded the sales of ores by 39,500*l.*, and as shown in my letter in the Supplement of Aug. 11 the expenses have been heavy in every department. It is so far satisfactory that the bulk of the money has been spent upon the mines, and I believe that Capt. Waters, the local manager, and Mr. Peter Watson, the managing director, are exceptionally good men for their respective positions.

Unless the returns of ore have been much larger and the expenditure much less since the date of the last balance-sheet, May 2, the working of the mines must still show a considerable loss, which the sinking of Watson's shaft at the Tankerville part will increase. A few years ago a tin mine in the St. Agnes district was in a somewhat similar position to what Tankerville is now, but the directors of that property were content to carefully plod on with as little expense as possible, and rely upon the ultimate success of the mine to reward them for their exertions on behalf of the company.

If the same course were adopted at Tankerville the same results may soon follow, and instead of the property being at a discount of about 80 per cent. it may before long approach to the value of the one above named, which is now at a premium of 2000 per cent., and returning to its shareholders in dividends the total amount paid up several times over every year, with a prospect of still better results in the future.—King's Norton, Aug. 22.

J. W. H.

#### LEAD MINING IN EAST CUMBERLAND.

SIR,—Your correspondent "J. C." seems to have got the idea into his head that the Nenthead and Tynedale Company is the only company likely to do any good in these days of low prices, simply because it is a large company, and is possessed of extensive machinery. May I ask if the company they "took over" from was not a large company, and possessed also of the same machinery? This being so why should the new be likely to do so much better even at lower prices. The fact may turn out to be that the extensive machinery taken over may have helped to extract the riches from the mines at Nenthead, and left deeper and more costly workings to the new company. The possession of zincworks will not make the difference. And why should "J. C." have such contempt for small concerns? Some of these have done well, and struggled also with low prices in former times; for instance the Hudgill Burn Mine, a close neighbour to Nenthead, gave its fortunate shareholders 30,000*l.* per annum for many long years, and was won for less than 500*l.*, without costly machinery.

J. H. R.

Newcastle-on-Tyne, Aug. 22.

UTILISATION OF THE SULPHUR IN REGULUS.—In connection with the calcination of regulus or matte Mr. J. W. CHENHALL, of Morriston, Glamorgan, has invented a process whereby the sulphurous acid produced by the combustion of the sulphur contained therein is obtained in a state well suited for conversion into sulphuric acid by the ordinary chamber process not being mixed with gases from carbonaceous fuel nor with a larger excess of air than is necessary for conversion to sulphuric acid. He claims that his improvements are applicable to regulus of all kinds which require calcination as a preliminary to further reduction, especially copper regulus and regulus containing gold and silver. According to the improved method of calcination he grinds the regulus and mixes it in a mortar mill with moist clay in sufficient quantity to make a plastic mass, which he fashions into balls and dries in the ordinary way; when dry he burns these balls in kilns of size and shape similar to those used for burning pyrites in connection with sulphuric acid chambers. After having been once lighted in the usual way, combustion pro-

ceeds without the use of carbonaceous fuel, and no difficulty is experienced in the case of copper regulus from fluxing or agglomeration. The product withdrawn from the bottom of the kilns is well suited for the next smelting or reducing operation.

#### REPORT FROM CORNWALL.

Aug. 23.—There seems no reason to be other than thoroughly satisfied, so far as it went, with the Dolcoath account. The acceptance of the Mayne shares was really inevitable, and so was the issue of the new ones to pay off the balance of Mr. Basset's fine; but there is such a thing known as fighting against the inevitable, and until the arrangements were finally accomplished it was not certain what difficulties might not be put in the way. Happily, wild talk has given place to common-sense notions. The appointment of Captain Josiah Thomas as purser as well as manager is only what ought to have been done long ago. The arrangements as to audit proposed are business-like and effective. The signature by the purser of all certificates of registry of shares fixes individual responsibility, and the inclusion among the audit duties of the checking of the share ledger, as well as of the dividend-list and bankers' pass-book, is only what ought to have been done from the commencement, and which if done would in all probability have saved this fiasco. We say in all probability, because it must be borne in mind that there is always a chance for the passing moment of the most elaborate system of checks failing, and there are always occasions in the interim of audits when mischief may be done. Make malversation as difficult as possible, and detection as certain, and that is all that can be done, and to this end we thoroughly agree with the appointment of two auditors instead of one. There are, of course, other matters to be considered, and we hope that the next account will make a final clearance of the grounds of grievance, real and alleged. Captain Thomas has shown an amount of consideration that does him credit in desiring that the question of his salary should stand over, but it should be fully considered and disposed of at the earliest moment, and so with all the other points. The future financial position of the mine is of course assured. Its immediate position will depend largely upon the price obtained for the new shares which Mr. Bailey is to offer for sale a fortnight hence. Seeing that an immediate advance followed the meeting a good price may be anticipated, and it seems quite on the cards that the much desired "small dividend" may after all be declared at the next meeting.

We cannot regard the result of the enquiry into the Wheal Agar disaster as at all satisfactory. Granted that the jury could hardly in justice to all concerned have arrived at another verdict than they did, there certainly has been an amount of looseness somewhere, which, and not pure accident, is responsible for what happened. Everything appears to have been in some fashion wrong or other, though it is not easy to mete out or apportion the due amount of a responsibility which, were it not divided, would be very serious. In fact if it could have been shown that any one person was responsible for the whole chain of events that led up to the dread calamity an amount of culpable negligence would have been indicated that would have amounted to criminality. Happily it is not so; and the many contributing causes are not summed up in one. There hardly appears, however, to have been a single point in which the right thing was done. Probably it would have been difficult to have ascertained that the rope was so dangerously corroded as turned out to be the case; but any way its use for a load of 20 tons is wholly indefensible, and its continued use for heavy loads after such a strain had been put upon it appears to show irregular ignorance, rather, perhaps, than heedlessness, of the injury that had been done. Then the use of the capstan rope for the winding up of the men at all was a direct breach of the law, seeing that it was not provided with an indicator. If the regulations in this one particular had been strictly adhered to, when the whim rope gave out, the men would have been left to find their way to grass by the ladders, and at the cost of a little extra toil 12 lives would have been saved. No doubt the adaptation of the capstan rope was prompted by the best motives; but, nevertheless, it would not have been done if no breach of the regulations had been committed. Lastly, we come to the men themselves and their violation of the law in crowding the cage in the way they did. It is quite possible under the circumstances, as we now know them, that an ordinary load might have come up safely; and that in the final issue they were strictly the cause of their own deaths. The lesson is that when the safety of life and limb are concerned no precaution however seemingly trivial should ever be set aside; and that the minutest infringement should be severely punished. As to the suggestion of the jury that cages should be provided with safety catches, that is so self-evident that it ought not to have cost 12 lives to enforce.

#### REPORT FROM NORTH AND SOUTH STAFFORDSHIRE.

Aug. 23.—The demand for best household coal has somewhat declined on the week, and the rates at which consumers alone care to do business are not responded to by vendors. Cannock Chase forge coal was in good sale, at about 6*s.* 6*d.* on the Birmingham and Wolverhampton Exchanges, but there was plenty of competition from outside districts, at prices ranging from that figure up to 7*s.* 6*d.* Good Thick coal for sheet-making sold freely at 8*s.* 6*d.* to 10*s.*, and at the latter price transactions were numerous for forges. Cokes sold fairly well, the descriptions at 15*s.* to 16*s.* moving most freely. There was not much business done in pigs. Prices ruled at—Average Staffordshire part-mines, 45*s.*; and all-mines, 65*s.* to 67*s.* 6*d.* Derbyshire sorts were from 46*s.* 6*d.* to 48*s.* and Blaina hematites were quoted 60*s.*, with business at a little under. Finished iron rates were unaltered, except for common bars, which were to be had as low as 5*l.* 17*s.* 6*d.*, or 2*s.* 6*d.* down on the week—a reduction found necessary in face of the trade which outside districts, especially Yorkshire, managed to do during the absence of production in the Staffordshire market throughout the strike, and a further fall is not unlikely.

On Thursday morning the new Coal Trade Wages Board met in Birmingham, to confirm the draft rules. Mr. Haden Corser, barrister, Wolverhampton, was elected President. All the draft rules were confirmed. The subscriptions were fixed quarterly at 3*d.* per man and 1*d.* per boy. The employers to pay a sum equal to the aggregate sum paid by the workmen in and about the mines. The men's money to be collected by themselves in any way they liked: 12 men and 12 masters constituted the Board, and six members, irrespective of either section, forms a quorum. The Board will have an assured 12 months' existence, terminably by three months' notice. An amendment that the existence should be six months with one month's notice being lost. The Board is to be elected annually every September; the next election to be in 1884. Mr. Dudley was appointed the employers' secretary, and Mr. Barnes the men's secretary, each at 50*l.* yearly. Each member will be paid 10*s.* for every day's attendance.

The formation of the new Wages Board for the South Staffordshire coal trade on the model of the current Wages Board for the iron trade of the same district has reached the stage where the draft rules are being discussed by the various centres of the district interested. At a large meeting of miners at Cradley Heath, on Tuesday, objection was taken to rule that one of the rules which provides that the Board shall continue to exist for 12 months certain, and then may be determined by three months' notice on either side. A resolution was passed in favour of shortening the term of existence of the Board, and of reducing the length of the notice for an alteration of wages. The men also expressed themselves adverse to the proposed umpires. The Brierley Hill men are dissatisfied with the proposal to allow the masters to deduct the contributions of the men to the Board, saying they would rather arrange with their delegates to accomplish this. They are also of opinion that a president is not required on the new Board. There are signs that the North Staffordshire coal strike, after a duration of some 15 weeks, is drawing to a close. The men are getting short of funds, and have again resolved to ask the masters to meet them, "with a view to returning to work at the old rate of wages." It is unlikely that after upholding the justice of the reduction so long the employers will concede the point, and the men are not in a position to hold out much longer, although



some accession to funds has just been promised through Trades Union Societies in the north of the county, comprising ironworkers, nut and bolt makers, brassworkers, and glassblowers. The ironworkers are continuing their efforts at organisation, and announce a monster meeting in furtherance of the object for the 27th inst., at which Mr. Broadhurst is expected to speak, together with the secretaries of the Warrington and Darlaston branches of the Amalgamated Association of Iron and Steel Workers.

The Sandwell Park Colliery Company annual meeting was held at Birmingham on Tuesday, when Mr. James Bissell, in moving the adoption of the report, said the gross profits upon the sales had been 5000*l.* less than last year. During the year they had to pay 2928*l.* more in wages than in 1882, while their sales of coal had fallen off. Mr. Cullwick opposed the report, and suggested that a committee of inspection should be appointed. Mr. Elwell pointed out that although this year the dividend had been reduced to 5 per cent., even that could not have been paid but for the large amount brought forward from last year. Mr. Parr expressed a doubt whether they had even made the profit which was stated in the report. In reply, the auditor said a case of defalcation had been discovered during the last few days, but it was of a trifling character, and had nothing to do with the present report. After a prolonged discussion, an amendment that the meeting should be adjourned was rejected, and the original resolution carried. A dividend at the rate of 5 per cent. was then declared, and the retiring directors were re-elected.

The Patent Shaft and Axletree Company report shows a net profit for the past year of 17,991*l.* After paying dividend on the preference shares, the remaining balance is 594*l.*, which is recommended to be carried forward. The directors attribute the smallness of the profit partly to keen competition and partly to heavy contracts for bridge and roofing work, the full benefit of which will not be realised till the work is complete. Part of the works are now being converted to meet the demand for soft steel.

#### TRADE OF THE TYNE AND WEAR.

Aug. 22.—The demand for the Northumberland steam coal has rather subsided during the past week; that is, there has not been so much pressure for ready terms on shipment of late: 6*d.* per ton above the current rates has often been paid for prompt shipment of cargoes. Most of the works, however, continue to be fully employed, and the current rates have been well maintained. All the works in the Seaton Delaval and Cramlington districts are about full time, the demand for coal being in excess of the supply. At the present time the Seaton Delaval Company are raising nearly 100 keels per day from their works, or at the rate of upwards of 500,000 tons per annum. The collieries in the Blyth and Amble district are fully employed; indeed, taken on the whole, the collieries generally in the Blyth and Tyne district have not had such a continued strong demand for their produce for several years. A lamentable accident occurred at the Seaton Delaval Colliery on Sunday morning, whereby two men were killed instantaneously. The two men were fitters, and they were descending a shaft under repairs, when the winding rope broke and the poor fellows fell a distance of 30 fms. to the bottom of the shaft. At Sunderland the demand for house, gas, and manufacturing coal continues very great, and the turns are very long at the colliery offices. Collieries producing the best nut coals have large orders on hand. It is remarkable that the output of coal in Durham has not been so large of late as formerly. The men are evidently, to a certain extent, restricting the daily output, and this movement at present has simply the effect of driving some of the orders in the market to Yorkshire, where it is stated the output is being increased. As the value of coal and coke in Durham is increasing it is probable that the wages of the miner will be increased when the next quarterly account is taken of the average prices realised.

The position of the Cleveland Iron Trade at the present moment is full of interest. There is a very large local consumption of iron at the rolling-mills; the shipments of crude iron from the Tees is fully an average. The production of Cleveland pig-iron is still restricted, but the price is still low, and the tendency is still to lower rates. Though stocks fall every month the price of Cleveland pig is lower than it was when the restriction commenced. The hope that restriction would have the effect of permanently raising prices has not been realised; it may, therefore, be concluded that any attempt to raise the price of iron or any other commodity artificially must fail, the great forces which regulate supply and demand can alone be relied upon. Cleveland pig is now quoted at 38*s.* 6*d.* per ton, and in October, 1881, it was 45*s.* There are fewer furnaces in blast now than in 1881, and the stocks have fallen from 435,000 tons to 270,000 tons, and yet the trade is almost as dull at Middlesbrough as at Barrow. It is now held that those who cannot make iron profitably should cease making. Cleveland has the advantage of cheap ironstone and cheap coal, and it is thought that it would be a wise policy to utilise more of this iron, and import less Spanish ore. There has been a little better feeling in the trade during the past few days, and as some improvement has occurred in Scotland makers are holding more firmly. There is not much change to note in the manufactured iron trade; there being plenty of work on hand, and no recent alteration in prices. The iron shipbuilding trade continues very brisk at all the yards in these rivers. There is, however, no prospect at present of the termination of the engineers' strike at Sunderland, and this lamentable occurrence is working considerable mischief to the general trade of the town and district. Business at the shipyards is much curtailed, as engines cannot be got to complete the ships. The forges and foundries are also crippled to a great extent. A considerable number of labourers and other classes of workmen are thrown upon the market. It is true that a considerable amount of work in the engineering trade for the Sunderland shipbuilders has been undertaken on the Tyne; but all the works on the latter river were very fully employed when the strike occurred, and only partial relief can be got from this arrangement. On Saturday a fine screw steamer of nearly 4000 tons burden was launched from the new yard of Messrs. Campbell and Co., at Scotswood, four miles west of the Newcastle Bridges. The *Tiverton* is constructed on the spar deck principle, and in the highest class at Lloyds, and is now being fitted with all the latest improved appliances. She is divided into seven watertight compartments. Her engines are by Mr. Clark, of Elswick, to indicate 1600-horse power, with a working pressure on the boiler of 100 lbs. per square inch. Her speed, laden, is expected to be 11 knots.

The Tyne Commissioners continue the dredging operations on a large scale above the bridges, and the river will soon be navigable for the largest vessels up to Scotswood. A large island called the King's Meadows, situated two miles above the bridge, is being rapidly removed. A few days ago a very large oak tree was got out of the river here, which is 60 ft. in length and 3 ft. in diameter near the base; the main portion of the tree is quite sound, hard, and as black as ebony. Docks have been projected for a long period at Dunston, two miles above bridge, and there is no doubt that docks will be required shortly in this part of the river at Dunston, on the south side, where a considerable portion of the coal and coke produce of West Durham could be shipped with great advantage, and on the north side of the river near Scotswood, where the coals and coke from Coanwood, Haltwhistle, &c., and from several other works between Scotswood and Hexham could be shipped. There is also an extensive coal field situated on the North Tyne, which has hitherto only been worked from shallow depths for landsale purposes, which is a most promising field for enterprise, as the demand for steam coal is evidently gradually improving, and this demand is likely to be permanent, as the number of steam-ships is constantly increasing, and the use of steam-power for all purposes is also constantly increased. It is well known that there is an extensive coal field containing several good seams of steam coal almost untouched in the North Tyne Valley, and the increasing demand for it must stimulate the proprietors of the coal in that district to utilise them at no distant date.

A joint committee of the Newcastle and Gateshead Corporations has been formed, and they are now occupied with the question of a new bridge across the Tyne. A plan of a bridge similar to that at Brooklyn, commencing at the Mort Hall on the north side, and terminating in High-street, Gateshead, has been before them. The

North-Eastern Railway Company could hardly be expected to make their bridge free, and thus relinquish a handsome revenue; but they have no monopoly for bridge-making across the Tyne. The plan submitted is no doubt an excellent one, as a fine approach could be secured to a bridge in that position, and the present approaches to the high level bridge are very bad. The projected bridge would effect a vast improvement, and there is no doubt whatever that it would also prove to be an excellent speculation.

The Chemical Trade on these rivers continues to steadily improve; there is a strong demand for the principal products, and their value is steadily improving. The prices of bleaching powder and soda ash are steadily rising, the price of bleaching powder at present is 6*l.* 17*s.* 6*d.* and soda ash 3*l.* 2*s.* 6*d.*

A NEW METAL.—Messrs. Young and Co., of Gateshead, have erected works at Redheugh, where they have commenced the manufacture of a new metal, which they claim has very peculiar properties, and that it is quite superior to any mixture in general use for various purposes, more particularly for bearings for engines and other purposes. It is claimed that it is much better adapted for these purposes than brass, gunmetal, or any other mixture in use. It takes a very high polish, and it is said that it is almost indestructible, and will last much longer than any of the substances now in use, and also that its use will effect a considerable saving in the amount of oil consumed in lubricating bearings, &c. Operations have been commenced at those works, and a considerable number of orders of various kinds have been received.

#### REPORT FROM NORTH WALES, SALOP, AND CARDIGAN.

Aug. 23.—At a meeting of colliery proprietors, held at Wrexham, on Monday, it was decided to make an advance of 1*s.* per ton on Sept. 1. This shows a healthy condition of the trade. The proprietors of the Plas-Kynaston Colliery, near Ruabon, which has been, and is, one of the most successful in North Wales, treated their workmen, with their families and friends, to a day's outing last week. Indeed, pleasure *fetes* and excursions seem the order of the day just now, except among lead miners, who—employers and employed—are too poor to afford a brief holiday. Captain Morris Ridge, of the Perkins Beach Mine, had an action tried in the Welshpool County Court last week, in which he sought to recover an amount for wages against a reputed partner. The judge held that the partnership was not proved, and so Captain Ridge lost the trial and his wages; and, as this was a test case, a number of working miners are in the same position.

In lead mining, everything is quiet from Llanidloes to Cardigan Bay, and there can hardly be a renewal of enterprise until prices mend. A fatal accident has occurred at Brynkinalt Colliery through a fall of roof over the Five-foot coal. The Government Inspectors stated that no blame could be attached to anyone, that the workings were in good condition, and that the slip could not have been foreseen.

The Prescwyn Colliery is to be sold. This is one of the only two collieries now left working south of the River Ceiriog. The trade seems centering in the Ruabon and Wrexham districts. But there is still a fine field to work in the Shropshire portion of the North Wales coal field. The whole of the eastern side of this coal field is the coal field of the future.

#### REPORT FROM DERBYSHIRE AND YORKSHIRE.

Aug. 23.—The report for the week as regards mining in Derbyshire cannot be given as at all favourable, for if one goes into the lead districts we are told that the low price of lead gives no profit to the mineowners or miners, whilst in the colliery districts it is stated that a really good business for the time of year is being done. Yet the price of coal is so low, the competition being so great, that their profits are infinitesimal, whilst the owners of the coal mines are now asked to concede to their workmen an advance of wages. Such in a few words is the actual state of mining in the county of Derby. So far as regards lead mining the prospects cannot be said to be very encouraging, for there are few besides Mr. Wass who have made any progress; and he has only attained the position he has done as the greatest of lead mineowners in Derbyshire by his spirit and recognising the fact that operations to be at all successful can only be carried on with a judicious outlay of capital and economising as far as possible by substituting manual by mechanical labour. This in all probability, we believe, Mr. Wass would even now say was not the least important factor to this undoubted and well-merited success; but in Derbyshire, perhaps more than in any other county or district where lead ore is raised, the want of capital has been the great drawback to profitable returns. All experience shows that what is called "tinkering" in mining property is a sure forerunner of disaster, and of this we have every day proofs. At the same time, on the other hand, where there has been a large outlay of capital, we frequently find the results most disastrous. Of this we have just had a strong proof in what has taken place at the Magpie Mine, near to Bakewell. About a year ago we were amongst the first to publish, at the instance of the directors, the important fact that there had been a magnificent discovery of blende, of such magnitude that the owners in the course of a few days would make immense fortunes. This has all been dispelled now, and the shareholders of the Magpie Mine are now called upon to pay a call of 4*l.* a share to meet the liabilities, some perhaps caused by the assumed great success. This is a lesson that should not be lost sight of by those who take an interest in investments in lead mines.

At one time, perhaps, the raising of ironstone in Derbyshire was of far greater importance than of lead, and almost of coal. But now there has been a marked change, for the iron ores of Derbyshire are entirely neglected, and the average raised in the county is comparatively trifling. The Staveley Company, the largest makers of pig and the largest consumers of it for their extensive foundries, found that they could raise it cheaper in Lincolnshire, and, consequently, took a lease of the Chapter grounds, near Fordingham. After that Mr. C. Markham, the able managing director of the Staveley Company, found it would be to the advantage of his company to import the ore direct from Northampton, and this is now being done. The situation of Derbyshire of late has, however, been of advantage to the sellers of iron in its raw state, so that the output has not been greatly in excess of the demand for it, whilst stocks held at the leading works are by no means large. At the foundries business has become more active, and there is a large output of pipes, cylinders, and other heavy castings.

In Sheffield there has been a decided falling off as regards some of the lighter branches of trade, but that is believed to be only of a temporary character, seeing that large orders for what is termed the "fall trade" are now expected to be sent in and of considerable dimensions from the States. The leading cutlery houses are fairly off for business; but such is not the case all round, for a good many of the workmen are far from being fully employed. As regards table cutlery in particular the demand on the part of the home districts has been particularly quiet; but at the same time it may be said that some fair, if not large orders, are in hand for America, as well as for several of our colonies. Just now there is a considerable drawback as regards the finest qualities of table cutlery, owing to the diminished arrivals of ivory tusks, and the high price which those that have been offered for sale have realised. Fine ivory for hafts is now worth something like 1*l.* per pound, and this high figure brought up the price of stag and pearl backs to a price higher than they have ever before realised. Despite the American tariff we continue to send large quantities of steel and all kinds of hardware to America, whilst our colonies still continue to be amongst our best customers. In the heavy departments the activity is as great as it has been, so that there is plenty doing in heavy armour-plates at both the Atlas and Cyclope Works, and the plates from these two great establishments have found no competitors. In other descriptions of rolled iron and steel business has been rather moderate, so that makers of Bessemer and crucible steel are by no means so busy as they have been. Still there is a strong belief that the next month will inaugurate a better state of things, and that the autumn orders

will be of sufficient magnitude as to find full employment for almost every branch of the local trade, always excepting steel rails, a branch which may now be said to have left Sheffield owing to the carriage rates of the different railway companies.

#### TRADE IN SOUTH WALES.

Aug. 23.—The condition of the Coal Trade is one of continued expansion and activity. Shipments during the past week have again reached June figures in amount. Cardiff sent away 140,968 tons foreign and 21,190 coastwise; Newport, 30,295 tons foreign and 21,844 coastwise; Swansea, 24,029 tons foreign and 7219 coastwise. Nothing can exceed the activity at Cardiff and Newport, while Swansea also shows an improvement. The Peninsular and Oriental Company is in the market, asking for tenders of from 10,000 to 50,000 tons in quantity. The generally accepted opinion is that prices, which are now very firm, will go higher. Double screened stand at from 10*s.* 6*d.* to 11*s.* 9*d.*; colliery screened, from 10*s.* to 11*s.* 3*d.*; small steam coal, 5*s.*

The sinking operations of the Powell Duffryn at Cwmpennar, carried on by Messrs. W. R. and J. Beith, of Blackwood, under the management of Mr. H. W. Martin and Mr. D. Williams, agent and sub-agent of the company, are proceeding very successfully. A few weeks ago the Four-foot seam was discovered, and proved successful. Last week, at the depth of 400 yards, the Six-foot seam was struck, and it is anticipated that in about a fortnight the Nine-foot seam will be reached. This new pit is sunk on the mountain side above Cwmpennar, almost equidistant between Merthyr and Mountain Ash.

It is very gratifying to be able to report that the general Coal Trade of the Rhondda Valley is at present in a most flourishing condition—in fact, as far as regularity is concerned, it may be declared to be almost faultless. At the Blaenrhondda and Fernhill Collieries at the top of the valley, unusual activity is now observed at both collieries, and this has been the case for some weeks past, not a single day having been lost through a scarcity of orders for a considerable time. At the Dunraven Collieries alike lower down, also full time is at present the order of the day. The same remark will also apply to the Rhondda Merthyr Colliery, and a larger quantity of the "black diamond" is now brought to bank than has been the case for a long time past. Great activity is still maintained at both Lady Margaret and Old Butte Pits (Butte Collieries), and it is pleasing to learn upon good authority that large orders are constantly being received. Since the settlement of the "doctor's dispute" at Ynysfeio Colliery, some two months since, that colliery has been going very regularly; not a day has been lost since the agreement was arrived at, and it has splendid future prospects. Coming down to the neighbourhood of Treorkey, it is very pleasing to find that matters are looking bright and encouraging. At the Ynyswen level a very considerable quantity of coal is now brought out and sent away for shipment, which formerly was not the case, the colliery being worked solely for household purposes. A large number of men are now employed there. At the Abergorky Colliery, since the change in the management took place, about a month ago, when two or three days were lost in consequence of the men's antipathy towards one of the newly-appointed officials, not a single day has been lost, and matters are now going on very favourably. There are at the present time about 1000 men employed at these large collieries. At the Tylacoch Collieries also matters are taking an encouraging turn. The colliery is now carried on by Messrs. Thomas and Evans, "The Colliery," as it is generally known by, is being rapidly opened up, and a considerable increase in production is shortly expected. The new company's first "pay" took place on Saturday week. Coming to the vast Ocean Collieries, the greatest animation is the order of the day, and has been for some months past, and there is every prospect of a continuance of the same. The greatest unanimity and friendliness also prevails between the men and the management. The sinking operations at the company's new pit at Cwm-park is rapidly being completed, and it may be confidently expected that in a very short space of time the "black diamond" will be seen coming out in large quantities. The Tynybedr, Bodringallt, Ton, and Gelli Collieries are also going very regularly.

Last week some parcels of iron were shipped at Newport as follows:—2340 tons to Naples, 1503 to Ibrail, and 1200 to Galveston. At Cardiff one parcel of 969 tons were shipped. The iron ore trade is still very dull, and prices are quoted at from 13*s.* 6*d.* to 14*s.* per ton. The amount received at Cardiff from Bilbao last week was 8130 tons, with 967 tons from other sources. Newport, 9700 tons from Bilbao, and 6450 tons from other sources.

The tone of the Tin-Plate market is not so healthy. Coke-mades are quoted at from 16*s.* to 16*s.* 6*d.* per box, but some inferior sorts may be had at 15*s.* 9*d.* Charcoal-made stand at 18*s.* to 20*s.*, with little demand.

CHESTERFIELD AND DERBYSHIRE INSTITUTE OF MINING, CIVIL, AND MECHANICAL ENGINEERS.—The Nottingham excursion meeting has been fixed for Sept. 11 and following day. The members and their friends will assemble at Nottingham (Midland Railway) Station, and proceed by road brakes to Wollaton Colliery, where the colliery plant, air compressing, and hauling machinery will be under the permission of Sir James Oldknow and directors of the company be inspected. Luncheon will be provided at the colliery by invitation of Mr. George Lewis, mining engineer for the company. From Wollaton Colliery the party will go to Clifton Colliery, and make an inspection of the colliery plant, underground hauling machinery, and Fisher's patent system of unloading and loading pit cages, by permission of the Clifton Colliery Company, returning on foot to Nottingham. On the second day the members will meet in the Council Chamber, Exchange Rooms, Nottingham, by permission of his worship the Mayor (Mr. Leonard Lindley), for the discussion and reading of papers, and papers open for discussion will be that by Mr. T. G. Lees, "On a Self-acting arrangement for Unloading and Loading Colliery Cages (Fisher's patent)," that by Mr. Robert Wilson "On the Koepe System of Winding at the Bestwood Collieries," and that by Mr. Sydney F. Walker "On the Electric Light and Transmission of Power by Electricity." (a) Electric lamps. (b) Dynamo electric machines. (c) Accumulators. The paper "On a system of Endless Rope Haulage in use at Clifton Colliery, Nottingham, with remarks on various Clutch Gears in use, and a description of a New Frictional Clutch for Hauling Engines and other Machinery," by Mr. Henry Fisher, will be read or taken as read. The members will then visit Sir James Oldknow's Lace Factory, University College, and the Castle Museum. For members who may have previously seen one or other of the two last-named places the privilege of inspecting certain works in the town is being arranged for.

DUDLEY AND MIDLAND GEOLOGICAL SOCIETY.—The fourth field meeting of the season, a largely attended one, was held under the direction of Mr. H. Johnson, F.G.S., the President, at Hamstead and Sutton, on Aug. 17. On arriving at Great Barr station those who had travelled by rail met the other portion of the party, who had come by break from Dudley. From thence the members walked to the Hamstead Colliery, where they were met by Mr. E. Smallman, Mr. Meacham and his son, the managers of the colliery, who first showed them a section of the measures passed through in sinking the shafts, together with specimens, and a collection of fossils found in sinking. These were examined with much interest, and proved that the strata are very similar to those passed through at Sandwell Park pits. The company then inspected the splendid engines and machinery of the colliery, and afterwards descended the pit and went through the workings, which are being opened out. Great interest attaches to this colliery, as it proves the existence of the Thick coal under the overlying permian rocks to a distance of more than two miles beyond the Great Eastern Boundary Fault. The coal is 8 yards in thickness, and of good quality, and as the area of the colliery is 500 acres the output will materially add to the local supplies for household and manufacturing purposes. The shafts are 623 yards in depth, and the whole of the arrangements are carried out with the most recent appliances and the greatest attention. In passing along one of the roadways underground, Mr. Meacham pointed out an interesting downthrow fault of a few yards, which was instructive to the geologists, showing the way very plainly in which these faults



are formed. With this exception the coal was found to be uniformly good and regular. On ascending to the surface, whither a few strokes of the engine rapidly brought the party, Mr. Johnson conveyed the hearty thanks of the members to the directors and managers of the colliery for their attention, and expressed the best wishes for the success of the company, of whose enterprise and perseverance he spoke in high terms. The party then drove to Sutton Park, where they dined; after which they inspected several of the gravel pits in the Bunter conglomerate, returning home in the evening, after an interesting excursion.

**IRON AND STEEL INSTITUTE.**—In connection with the autumn meeting at Middlesbrough on Sept. 18 and following days an influential local committee has been formed, under the chairmanship of Mr. Bolckow, and has organised a series of excursions and entertainments in honour of the Institute. The new Basic Steel Works of the North-Eastern Steel Company, and the new and very extensive works of Bolckow, Vaughan, and Company, at Eston, will be the chief works to be visited, and as they are the first works that have been established in this country for carrying on the manufacture of steel by the Basic process, it is likely that they will be examined specially by the various members. Another interesting excursion will be made to the South Durham coal district, where a new system of manufacturing coke, admitting of a very considerable economy in the yield as well as in the collection and utilisation of all the bye products obtained by the distillation of coal, has been for some time successfully at work. A very good list of papers has been formed for reading and discussion, and a fund of several thousand pounds has been raised to cover the expenses of entertaining the members of the Institute.

#### MINING INSTITUTE OF SCOTLAND.

The summer meeting of the Institute, held at Hamilton, has been a most successful one. Nearly 60 gentlemen were present from all parts of Scotland, including colliery owners, managers, and others. At noon the party proceeded in conveyances from the hall of the Institute to Cadzow Colliery, about a mile and a-half above the town, and were received by Mr. Austine, the managing partner, and by him and Mr. Hamilton Smith, the manager, conducted down No. 2 pit, which is sunk to the Ell seam, the celebrated Seven-foot household coal of the district, at a depth of 123 fms. The miners were all idle in connection with the agitation for a rise of wages, but a capital opportunity was afforded for examining the haulage system of the colliery, which is probably the most complete in existence. No. 3 pit was also descended, where other phases of the system were seen and examined. The powerful surface machinery, including a Cornish pumping-engine and two Guibal fans, with the other arrangements, also afforded much interest to the mining men present. After lunch, which was provided by the company, Colonel Hamilton, M.P., who formed one of the party, was introduced by Mr. James Smart, Vice-President, and delivered a short address on the establishment of life-saving apparatus at mining centres to provide against colliery disasters. He explained that his attention had been called to the subject by receiving several letters in London from Mr. Fenwick, asking him to attend meetings for the purpose of forming an association to establish the Fleuss apparatus in mining centres. He did not attend the meetings, because, after consulting with gentlemen interested in mining in the House of Commons, he came to the conclusion that they would not lead to any practical result.

Mr. Hamilton went on to give extracts from a lecture delivered in London by Dr. B. W. Richardson in explanation of the Fleuss apparatus. He added that he did not know that it would be of so much use in this district, where accidents were mostly caused by falls from the roof and sides, and without recommending the apparatus he left the subject in the hands of the members as those best able to judge as to its merits. He thought, however, he had said enough to show them that it was no humbug. Mr. Smart stated that the subject had been before the Council of the Institute, who found that while in some instances the Fleuss apparatus had done wonders, in others it had not been so successful. They hoped shortly to be able to test its merits with the view to the establishing life-saving associations in the leading mining centres. Hearty votes of thanks to Mr. Hamilton and Mr. Austine concluded this part of the proceedings. The party then drove to Garnock Colliery, belonging to Mr. John Watson. They were received by Mr. James Gilchrist, the manager, who conducted them underground, and showed them the electric light, which is still kept burning at the pit bottom and on the leading roadways, and also the haulage machinery. The sights on the surface were no less wonderful—the magnificent winding-engines and engine-houses as trim as a lady's boudoir, the ventilating fan and the screen arrangements, themselves an amazing scene of activity, where from one shaft nearly 1200 tons of coal are cleaned and trucked daily. They also were shown an engine-house in course of construction for a pair of coupled engines, by Shanks, of Arbroath, to replace the existing power for driving the dynamo-machine in order to increase the present extent of electric lighting in the pit and provide for its extension to the mansion house of Earnock. Votes of thanks were accorded to Mr. Watson and Mr. Gilchrist before leaving. Facilities were offered for visiting the High and Low Parks of Hamilton Policies were largely taken advantage of during the day. The weather was fine, and the arrangements of the secretary, Mr. James Barrowman, highly satisfactory. The members afterwards dined together in the Commercial Hotel, and afterwards a meeting of the Institute was held, when a paper by Mr. B. T. Moore on "French Views of English Mining" was discussed, and another read by Mr. R. Beith on "Experience of Forcing and Exhausting Fans."

#### STEAM-BOILER FOR LIQUID FUELS.

An improved form of steam generator for using liquid fuel, such as petroleum and its analogues, has been invented by Mr. HUGH MONTGOMERIE, of Cleaton, Durham. In carrying out the first part of his invention he proposes to construct the steam-boiler with one or more furnaces, extending through its entire length, terminating in a combustion chamber or chambers formed separately from the generator or boiler, and protected from radiation or over-heating by any of the well-known appliances. From the combustion chamber or chambers the flame and gases return through side flues to the front, where they are received in chambers formed separately from the generator, and conveyed by small tubes above the side flues again to the back into an upper combustion chamber or chambers, where they unite and again return to the front through small tubes, above the furnace or furnaces, into an uptake which leads to the chimney. He proposes so to arrange the small tubes in the various groups as to facilitate the upward tendency to spreading and dispersion of the flame and gases among the tubes, and thus to increase their heating efficiency.

In carrying out the second part of his invention Mr. Montgomerie constructs a burner in the form of two cones, one within the other, the outer cone being bored out, and the inner cone turned up on outside, leaving a very small annular space between them open at their larger ends, but closed at their smaller ends. The annular space between the two cones can be increased or diminished, and adjusted to the greatest nicety by a screw and nut, which will draw the inner cone into (the outer one, or vice versa). The smaller end of the inner cone terminates in a screwed shank, which receives a cock connected by a pipe to an air reservoir, containing compressed air. The smaller end of the outer cone is also fitted with a cock, which is connected by a pipe with the reservoir containing the liquid fuel to be used. In the larger end of the inner cone is fitted a circular disc, by which the outlet for the air can be regulated with extreme accuracy. The liquid fuel, being admitted to the annular space, flows to the open end, and there meets with a strong current of air admitted under pressure by the cock from the air reservoir, which converts the fuel into a spray which, being ignited, the flame is carried forward in a circular spreading form, so as to fill the whole area of the furnace.

When desirable any portion of the annular outlay for the fuel may be stopped by inserting thin strips of metal, so as to make the flame of a crescent form, or a series of sectors of the circle, and

cause it to play only upon certain portions of the furnace. The reservoir in which the air is contained is supplied by a separate pump, which may be operated by hand until steam is available. By means of this pump air is forced into the reservoir under any fixed pressure, which is prevented being exceeded by a safety-valve. In some cases steam may be used to supply the current to the burner, but he prefers the use of the air as being more effective.

#### THE CHANNEL TUNNEL.

The advocates of this scheme still continue their insidious efforts to induce the public to adopt a more favourable opinion concerning it, but it is gratifying to find that their fallacies are exposed and exploded as soon as they are put forward. Investigating the validity of Sir Henry Tyler's recent plea for the Channel Tunnel, the Saturday Review maintains that it is vitiated by the very same fault which vitiates the arguments of all tunnelites, the fault which (probably by a clerical error) the minority of the Joint Committee attributed to the enemies of the scheme. He has (it adds) "with much ingenuity assumed the presence of every condition favourable, and the absence of every condition, adverse to the view he holds. There is no need to dwell too hardly on mere details. It would be cruel to lay stress on the fact that while Sir Henry Tyler draws a vivid picture of the wretched fate of a French army in "a submarine culvert completely dark," Sir Edward Watkin expressly informs us on the first page of the evidence that his tunnel would be "a place under the sea as light as day."

We shall not dwell too much on the fact that the elaborate system of exclusively military galleries intervening between two single-line tunnels and solely under the command of the War Office, which Sir Henry suggests, has certainly not been promised or formally suggested by any other tunnel advocate. We shall even make Sir Henry a present of the observation that, whereas he boasts his galleries as something quite remote and afar from any mouth of the tunnel which can be seized, they in their turn must have a mouth somewhere, and that mouth must be protected by guarding fortresses as extensive as those suggested for the mouth proper, if it is to be free from the chances of a coup de main. We waive all these things with the generosity with which *ex abundantiâ rationum* it has always been possible for an opponent of this most mischievous scheme to waive half his arguments. Sir Henry Tyler, like everybody else on his side, either really believes, or affects to believe, that his opponents deny the possibility of rendering the tunnel useless.

For more than a year past those opponents have been, with unflinching endeavour and unbroken politeness, imploring him and his fellows to observe that they do nothing of the kind. Sir Andrew Clarke's forts are good; Sir Frederick Abel's explosives are good; Sir Henry Tyler's system of galleries with masked portholes, whence a cunning lieutenant of engineers shall reduce a passing French train to matchwood and mince-meat, is extremely good. We, simple as we are, will undertake to devise half a dozen other schemes for confounding the knavish tricks of every foreigner which shall be indifferent good likewise. But the two points which Sir Andrew, Sir Frederick, and Sir Henry entirely forget, but which we, simple as we are, do not forget, are these. First, who is to assure us that the infallible means will be applied at the right moment? And secondly, even supposing an alert Ministry to get them ready at the first warning of danger, what would the effect be on the traffic of the tunnel, and so on the state of commerce and politics? Sir Henry says that his galleries, with their explosives and masked guns, would be "taken charge of by a moderate garrison, chiefly of officers."

His late comrades of the engineers may thank him for this scheme of making them sit *en permanence*, like mermen bold, under the sea, each with a portfire in his hand, during peace and war, ready to fire the explosives and unmask the guns. If they do not sit *en permanence*, how is the tunnel to be guarded from surprises? But if they are only to be ordered to light their match and take their camp-stools into the galleries when French journalists are insolent or French missionaries find it convenient to quarrel with the Society for the Propagation of the Gospel, does Sir Henry Tyler think that his friend Sir Edward Watkin's traffic returns will look very well at that time? Everything is known in England, and the idea that, at every other telegraph post through 30 miles of tunnel, a brisk young engineer is sitting behind a thin screen of chalk ready to blow passing trains to smithereens if anything strikes him as suspicious about them, is not on the whole likely to make a family man choose that route for his visit to the Continent. It must be a very dull imagination that cannot picture the indignant deputations that would wait upon Foreign Secretaries, Secretaries for War, Prime Ministers, and so forth, in such a state of things, and it must be an equally dull one which cannot picture the lively state of the Stock Market at such a time.

#### THE SOCIETY OF ENGINEERS AT THE BRIGHTON RAILWAY WORKS.

The members of the Society of Engineers paid a visit of inspection on Thursday to the locomotive works of the London, Brighton, and South Coast Railway Company at Brighton. They were conveyed by train from the Victoria Station to the terminus at Brighton. Luncheon was provided for them at the Royal Pavilion, at which the President of the society, Mr. Jabez Church, member of the Institute of Civil Engineers, and F.G.S., occupied the chair; and there were also present Mr. Arthur Rigg, C.E., Vice-President, Mr. Joseph Bernays, C.E., and Mr. W. Macgregor, Vice-President; Mr. R. Beridge, Mr. J. H. Hovenden, Mr. A. J. Walsley, and Mr. John Waddington, members of the Council; Mr. E. W. C. F. Schmidt, Mr. A. Williams, the treasurer, and Mr. Bartholomew Reed, the secretary; the party numbering together about 150.

After the luncheon they proceeded to the railway terminus, where the works are situate, and where they were received by Mr. W. Stroudley, the superintendent, and Mr. Jeffrey, the foreman, who conducted them through the various shops, including the iron foundry, the saw-mills, the carriage-building shop, the boiler shop, the erecting shop, the copper-smiths' shop and brass foundry, the fitting and turning shop (locomotive), the fitting and turning shop (carriage), the smiths' shop, the new carriage-painting shop, the trimming shop, and the running sheds. The railway company make and repair their own engines, and construct and repair their own rolling stock, and it is in these workshops that the engines and the carriages are constructed and, when requisite, repaired. Every kind of work for the construction and repair of the rolling stock is here carried on, and it is only on going over the establishment, and seeing the great number of processes of different kinds, and the number of men busy at work in every department, that anyone could form the least idea of the immense amount of work, and consequently of expense, involved in the maintenance in an efficient state of the rolling stock of a railway even of the comparatively limited mileage as that of the Brighton and South Coast Railway—some 430 miles. Some notion, however, of the amount of work done may be gathered from the fact that on an average 25 new steam-engines are built every year, and all of them are kept in repair, and that the company has 2000 carriages always in use, which require constant renewals and repairs.

In order to accomplish the work with the greatest economy and efficiency every known mechanical improvement and every appliance for the saving of labour are here taken advantage of. There is no rule of thumb, for everything is done by machinery driven by steam, and nothing is left to the judgment of the workman. By this means exactitude in the cutting of the wood to form the different portions of a carriage is ensured, and the same remark applies to the different parts of a steam-engine, some of the parts of which are made to fit any engine. These various appliances called forth from time to time the admiration of the visitors, and one of them remarked that he was never in any set of workshops where he had seen so many clever contrivances for the saving of labour. One thing which the visitors seemed to be especially interested in was the Westinghouse brake, which it was stated is fitted to every passenger train on the company's system, and the easy application and the effectiveness of which in stopping in a few seconds a train going at full speed was shown. A new electric com-

municator between the passengers and the driver, an invention of Mr. Stroudley, was also exhibited, and an apparatus which records the speed of a train at different stages of a journey and the amount of resistance of the wind. And, as showing the great power available for dealing with the engines, an engine stated to be of the weight of 36 tons was lifted a height of 8 or 10 ft. and moved sideways several feet by a hydraulic engine, the rams, of which there were two, having a pressure of 700 lbs. to the inch.

After the inspection the visitors adjourned to the Royal Pavilion, where they dined together, Mr. Jabez Church being again in the chair, supported by Mr. Cox, the Mayor of Brighton, and several of the members of the Corporation. In proposing "The Brighton and South Coast Railway Company," the Chairman said they had to thank the company for allowing them to go over their works, and Mr. Stroudley for the way he had received them. He believed the members of the society had never spent a more instructive day. He had seen most of the railway works in England, and he had never seen so many mechanical contrivances for overcoming little difficulties and manipulating material as in these; and all the machinery was excellent of its kind.—The other toasts were the health of Mr. Church, the President, proposed by Mr. Bernays, and the health of Mr. Williams, the treasurer, and Mr. Reed, the secretary, after which the company broke up, and most of them returned to London by a late train.

#### AMALGAMATING AND SETTLING APPARATUS.

The invention of Mr. FREDERICK MORRIS, of San Francisco, consists of improved arrangements and combinations of parts by which pulp or even tailings may be advantageously treated for the recovery of the precious metals contained therein. Said apparatus is formed or made in substantially the following manner. Upon suitable sleepers or supports are placed the bottom planks of a preferably wooden circular tank or vessel. Upon said planks rest the internal bottom planks of said vessel, and upon this in turn rest a series of flat fan-shaped dies formed of wood so cut that the grain is vertical.

These dies are placed comparatively close together, but absolute contact at their sides is prevented by means of wooden strips of less vertical depth placed between them, and thus a series of radial channels are formed around the entire tank. At the outer ends the dies are kept from coming in contact with the sides of the vessel by a strip similar to that employed to separate said dies, while at the inner extremities they are kept in position, and from contact with the pillar by wedges. The central pillar rises nearly to the top of the tank, and carries one or more vertical outflow pipes, which pass through it, and out at the bottom of the tank, where they discharge into a sluice or other waste pipe. The advantage of drawing off the water at the neutral centre, where it is comparatively still, will be obvious. The pillar carries a metal footstep in which can revolve a shaft upon which is secured a double tee-hub or boss, in which is secured two or more radial arms (the number being preferably four). Passing vertically through the outer end of said arms are a series of elongated bolts or tie rods, the lower ends of which carry suitably weighted wooden shoes cut to leave the grain in a vertical position. These shoes cover radially slightly more than one half the dies upon which they rest, and are alternately arranged so as to pass over the outer and inner horizontal faces of the dies when the shaft and arms are revolved. The leverage strain on the vertical rods is in part borne by suitable tie rods passing from one shoe to the immediately preceding arm. The vertical shaft passes through a T-shaped bearing secured to the top cross beam of the vessel, and terminates in an inverted bevel gear wheel. Beneath said bevel wheel and gearing thereinto is a second gear wheel attached to the horizontal driving shaft, the end of which rests in the shank of the before mentioned T-bearing, while its outer extremity is suitably supported, and is provided with fast and loose pulleys in order that the apparatus may be driven by a belt.

The cross top beam is supported in sockets bolted to uprights secured to sides of the vessel, and is held in position by means of taper pins or bolts, which pass through both the sockets and the beam. This arrangement of parts enables the vertical shaft with its gearing to be lifted out, and removed without interfering with the rest of the apparatus, while after removing the taper pins or bolts the cross beam and the balance of the gearing may be removed, thus leaving the vessel perfectly open at the top for the removal of the radial arms supports and shoes, or the entire gearing and radial arms with their connected parts may be removed without disconnecting the vertical shaft from the said radial arms. This is very convenient, enabling rapid cleansing or repairing to be accomplished. It will be understood that the ordinary process of treating the metallic substances by amalgamating and settling is to be carried on in this apparatus, and after settling the water is gradually and quietly drawn off by a series of taps arranged at different heights upon the sides of the vessel.

**THE LARGEST RAILWAY COMPANIES IN AMERICA.**—The New York Journal of Commerce gives the following interesting information as to the railway companies of the States:—The Union Pacific Railway Company is the largest company in America. It has 4269 miles of rails, capital 18,000,000. The Pennsylvania operates 1173 miles, capital 17,000,000. New York Central, 993 miles, 18,000,000. Capital; Wabash, 3348 miles, 10,000,000. Capital; Missouri Pacific controls 5533 miles, capital 6,000,000; Louisville and Nashville 2028 miles, capital 5,000,000; Lake Shore, 1277 miles, capital 10,000,000; Illinois Central, 1892 miles, capital 6,000,000; Chicago and North-Western, 3278 miles, capital 7,500,000; Chicago, Milwaukee, and St. Paul, 4353 miles, capital 7,000,000; Chicago, Burlington, and Quincy, 3136 miles, capital 14,000,000; Central Pacific, 2995 miles, capital 12,000,000; Baltimore and Ohio, 1553 miles, capital 4,000,000; Northern Pacific, 2091 miles, capital 18,000,000. Erie, 1020 miles, capital 17,000,000.

**GAS LIGHTING AND ELECTRICITY.**—The panic which existed a few years since among holders of gas shares in consequence of the propagation of the view that electricity was to be the light of the future is now almost forgotten; but the miserable condition of the electric light concerns, without exception, cannot but cause those who suffered from the panic to look back upon the baseless shadow which frightened them. At the meeting of the South Metropolitan Gas Company on Wednesday, a dividend at the rate of 12 per cent. per annum was declared, and Mr. G. Shand (the Chairman) stated that gas was now being used extensively for warming and cooking purposes, and a most important test was being successfully carried out in the company's district, in which a baker's oven had been successfully and economically heated by gas. If that were carried out throughout London a great increase in the consumption of gas would be the result. Although the electric lighting companies had taken a new departure in obtaining provisional orders for the lighting of private and public places in competition with gas companies, the latter had nothing to fear therefrom. As to the amalgamation of the gas companies of London, he said that the Gas Light and Coke Company had made overtures to them for an amalgamation, and with that object in view negotiations were now going on between the two companies. Of course nothing would be decided without the shareholders being called together to sanction it. In any such amalgamation the interests of consumers must be the first consideration. He then spoke of the great increase in the value of gas companies' shares since the first scare about the electric light, and said there was a bright prospect before the company.—Mr. G. Livesey (the Deputy-chairman) said that although there was a large field for the use of gas for cooking and warming, and as a motive power, still their mainstay must be for lighting purposes. In 1878, when the electric light scare was so great, he thought he had too much invested in gas undertakings, but, upon consideration, he found that it was one of the few investments with at least a safe 6 per cent., and he had, therefore, invested 95 per cent. of all he could put by in gas shares. This is scarcely surprising when it is considered that not a single electric light company has yet paid a dividend out of earnings from supplying either light or apparatus. The dividends that have been paid have been merely the result of dividing vendors' plunder, a parent company taking advantage of momentary absence



of failure in order to entrap dupes to subscribe the capital of subsidiary companies, the larger portion of this subsidiary capital being actually contributed by the enthusiasts who are promised the return of a portion of it as dividends on their shares of the parent concern. Electric light companies generally are now altogether out of favour; some have already entered, and others are hurrying on the way to the winding-up courts, and it is pretty safe to predict that within 12 months electric street lighting will be nowhere in use.

#### AMALGAMATING ORE SEPARATOR.

Among the recent inventions of interest to the mining community is an ore separator which operates on the amalgamating plan, and is intended to be placed behind a quartz mill, where the tailings may be passed through it. There is a washing cylinder-case having a flat base trough and a cover-section hinged together. It is explained by the San Francisco Mining and Scientific Press that at one end the cylinder has a full end wall, while at the discharge end the base only is closed, the water and sediment flowing out at the open end of the cover-section. A rotary shaft extends lengthwise through the central portion of the cylinder, and is journaled in boxes at the ends. To this shaft are securely attached on opposite sides a series of inclined but parallel copper flume-blades, which have curved outer margins of elliptical form, moving, as the shaft is rotated, near the case wall. A base trough is cast at the bottom of the lower section of the case, and forms an offset. The trough is shallow and its floor is flat, extending from end to end of the case.

In the side walls of the trough are vertical grooves, in which are seated a series of transverse ribs or riffles, these being made removable. The upper edges of the riffles are designed to lie quite near the margins of the flume-blades, so that the particles of gold passing therefrom will be quickly stopped in the interspaces or cells between the riffles, in which quicksilver is placed. Near the closed end of the case is placed in the cover-section an entrance spout or hopper, through which the pulp from the stamps falls into the case, falling on the first flume-blades of the series whereon the sediment is washed, and as the blades turn and assume a vertical position passes downward in the interspaces, the upper portion, however, being caught by the succeeding flume-blades and further washed, and again falling through the interspaces as the shaft rotates. The broad rotating flume-blades are covered with quicksilver, and are designed to catch during the operation the lighter particles of floating or flour gold. As the heavier portions of the sediment fall from the flume-blades through the interspaces they are received by the riffles in the base trough, which prevent their rapid passage, so that the particles of gold therein being of superior gravity fall and are caught in the cells of the trough. As the lower end of the case is closed at the discharge end by the half wall, the water cannot flow out under the mass and wash off the heavy particles of gold, but must overflow, passing over the half wall and leaving the valuable portions of the sediment therein, to be acted on again and again by the current and the rotating blades.

#### TRADE MARKS AND TECHNICAL EDUCATION IN GERMANY.

Referring to the trade and commerce of Westphalia and the Rhine provinces, Mr. Broadbent, British Consul at Cologne, writes that a distinctly healthy tone of public opinion is gaining ground in reference to the protection of trade marks, which hitherto there has been a tendency to imitate. In the manufacture of iron signal successes have been achieved quite recently, especially in the improved quality of steel-wire now produced, said to be superior to the best that England can show. Again, in iron shipbuilding, as well as in various departments of machine making, the opinion is said to be gaining ground in America that the Germans are now in a position to compete with us on equal terms. And also quite recently a particular description of steel shovel hitherto supplied to the Russians exclusively from the United States has been produced here, equal in every respect to the American original, and delivered in Russia at a price 30 per cent. below that hitherto paid to the Americans. The course of the iron trade has, according to the annual report of the Essen Iron Exchange, been characterised by an unaccountable discrepancy between the prices of the various sorts of raw iron, which have had a continually weakening tendency, and those of the finished or half-finished state, for there has been a decided advance in the quotations of rails, plates, rods, &c.

Nevertheless, there is every evidence that the trade generally is in a thoroughly healthy condition, and in every branch the greatest activity prevails. The stimulus given to railway extension by the acquisition of the railways by the State, has been in itself the means of imparting a quite exceptional activity to the trade. Moreover, there is evidence in the accounts of the different joint-stock companies published at the close of the year, that operations have proved abundantly satisfactory to shareholders. Dividends have been declared, varying from 5 to 15 per cent., with ample provision for contingencies. Capital, in individual cases, has been largely increased, works extended, new machinery supplied, and in more than one instance enterprise and capital have been transferred to Russia, where a large Westphalian concern is now successfully engaged in wire manufacture. Still there are loud and ever increasing complaints of the insufficient quality of available labour as well as of the inadequate supply of skilled labour. Great efforts have been made by employers personally to remedy the evil, and facts already adverted to go to prove that these efforts have not been wholly unsuccessful, although they are too often baffled by the unscrupulousness of neighbours and the eagerness of the workmen themselves to turn their newly acquired skill to better account. There is apparently a hopeless incapacity for combination for trade purposes amongst the operative class in Germany; they are consequently suspicious of one another as well as towards the employer, a circumstance which aggravates the difficulty which he finds in securing the services of a permanent staff of skilled mechanics. No doubt, from their own point of view, the employers as a class judge wisely in giving a general support to Prince Bismarck's scheme for mutual assurance against sickness and accident. The workman, once a party to the scheme, would furnish certain securities at present wholly wanting against the prevalent restlessness, fatal quite as much to his own interests as to those of his employer.

That any considerable success has been achieved through the instrumentality of technical schools can hardly be maintained when, for example, in the town of Elberfeld, with its manufacturing population of 100,000, only 360 pupils should be found to pass through the prescribed course in one year. The wonderful progress which Germany has made in commerce and manufactures in the last 20 years must be ascribed to the energy, intelligence, and resolution displayed by the representatives of capital—to the way in which they devote themselves to the scientific and technical study of the business in which they are about to engage; while, where taste or the æsthetic element come into play, it is unquestionable that the average German manufacturer has in the course of his education had opportunities such as neither Frenchman nor Englishman enjoy of cultivating a perception of the beautiful in art in the numerous galleries of the Fatherland, to say nothing of the neighbouring and easily accessible countries of Holland and Belgium. In the manufacture of textile fabrics, where the operative is at best, but a more or less intelligent machine tender, the initiative in selection of the particular fabric to be produced, as well as of the pattern and fashion of the article generally, must of necessity rest with the principal concerned, and here accordingly, rather than in any amount of technical education to be imparted to the operative, must originate all those qualities which go to secure supremacy in one and every branch of manufacturing industry. On the other hand much astonishment is expressed that there should be such a want of aptitude on the part of British manufacturers to adapt themselves to altered conditions of trade, to provide for the constant shifting of the sands of fashion; and that in the case of the Bradford manufacturers in particular they should have been so ready to abandon a speciality which elsewhere and in modified forms has enabled the spinners and weavers of Elberfeld, Barmen, and Crefeld to tide over bad times without signal disaster

or defeat, and to find themselves in the end indeed engaged in a more than successful competition with their Yorkshire rivals and preceptors. In the mixed fabrics known generally as satin cloths, used for linings of coats, umbrella coverings, &c., and now produced from colonial wools, the Germans appear to be surpassing us not only in cheapness but in quality, and the same may be said of the plushes and velvets woven on a cotton warp.

The activity in the iron trade has had the natural result of increasing the demand for coal, and prices have had a constantly growing tendency during the year. Coke, in particular, has been in extraordinary demand, and at prices hitherto unheard of. The output for 1882 shows an increase of 9.4 per cent. as compared with 1881 in the Dortmund district alone, while in the course of 14 years the production has risen from 11,443,944 tons in 1868 to 23,642,547 tons in 1881, and to 25,873,428 tons in 1882. The local consumption of the Dortmund district now equals the entire yield of 1879—being 19,000,000 tons. Freights still stand in the way of a proportionate increase in the export of Westphalian coal to Hamburg and Berlin.

#### COPPER MINING DEVELOPMENT IN AMERICA.

The unusually promising character of the Copper Queen Mine has already been noticed in the *Mining Journal*, and the results obtained in development appear to fully justify the most sanguine expectations that were entertained. The annual report of the Copper Queen Mining Company affords, says the New York Mining Record, a satisfactory showing to the stockholders and creditable exhibit for the management, as may be seen from the following figures:—

Ore on hand, April 1, 1882 .....	Tons	501
Mined during year .....		32,942.400
<b>Total</b> .....		<b>33,443.400</b>
Smelted during year .....		22,028.1259
Leaving balance on hand April 1, 1883 .....		1,414.1141
The product of copper for fiscal year was as is understated:—		
1882—April .....	Lbs.	725,339
" May .....		627,196
" June .....		756,137
" July .....		713,700
" August .....		690,272
" September .....		653,359
" October .....		732,951
" November .....		720,820
" December .....		721,636
1883—January .....		671,313
" February .....		676,142
" March .....		720,247
<b>Total</b> .....		<b>8,409,112</b>

This copper was 96½ per cent. fine.  
Net value of year's product of black and ingot copper...\$1,314,973 25  
Total of operating, freight, refining, administration,  
and all other expenses ..... 761,071 13 |

Profit on year's operations .....	\$553,902 12
Out of which the following dividends have been paid to stockholders:—	
July 1, 1882 .....	\$100,000
October 2, " .....	125,000
January 6, 1883 .....	125,000
April 16, " .....	125,000
<b>Total</b> .....	<b>\$475,000 00</b>

Added to surplus account .....

Surplus at end of first fiscal year .....

\$ 78,902 12	188,126 39
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Surplus at end of second fiscal year .....

The above result has been produced with the operation of two of Rankin, Brayton, and Co.'s Pacific copper smelters, each of 30 tons rated capacity, giving a net product of 23,038 pounds bullion per day, counting every day in the year. No such showing it is safe to say has ever before been made either in this country or Europe.

**COAL IN AMERICA.**—The output of coal in the United States during last year, according to the report of the United States Geological Survey, was 87,083,134 tons, exclusive of the local and colliery consumption, estimated at 6 per cent. more. The output for the first six months of the current year is estimated as 44,010,767 tons, or more than half the unprecedented output of last year. According to the census returns, the American coal output in 1880 was 63,773,603 tons. The output last year, therefore, shows an increase of 23,310,000 tons or 36½ per cent. against 1880. Of this increase no less than 19,769,624 tons was bituminous coal, lignite, &c., and only 3,539,907 tons anthracite.

**THE COAL AND IRON RESOURCES OF AUSTRIA.**—During 1881 (the latest date of report) the mineral products of the Austro-Hungarian Empire amounted to 8,961,498 tons of lignite, valued at 40,048,707 frs., and averaging 4½ frs. per ton; and of coal 6,343,315 tons, of the value of 5,841,077 frs., and averaging 8½ frs. per ton. The portion of the empire most productive in mineral fuel is Bohemia, which yielded 6,450,996 tons of lignite (nearly three-quarters of the whole) and 3,417,632 tons, or more than half, of the coal supply. Styria contributed 1,640,154 tons of lignite, and Silesia 1,749,598 tons of coal. The extraction of lignite employed 29,083 miners, working in 352 pits, while that of coal employed 37,133 hands in 365 collieries. The production of iron ore was 618,963 tons, of the value of 4,470,505 frs., which was worked as follows:—Styria, 420,974; Corinthia, 88,041; Bohemia, 70,206; Moravia, 11,401; other provinces, 28,341. There are 241 iron mines, though only 77 actually at work, giving employment to 4510 workmen. Throughout the empire there are 175 blast-furnaces for iron smelting, out of this number only 79 were in activity during 1881, the yield of iron being 379,639 tons, of which 337,843 were refined pig. Each furnace on an average was in blast for 43 weeks during the year, and the number of hands employed was 8105.

**GLOSSARY OF TERMS USED IN COAL MINING.**—The vast number of technicalities used by coal miners, and the purely local character of a large proportion of them, renders the compilation of a glossary such as that of Mr. Gresley—A Glossary of Terms used in Coal Mining, by William Stukeley Gresley, A.M.I.C.E. London: E. and F. N. Spon, Charing Cross—exceedingly laborious; but from the amount of information which he has brought together it is evident that the quantity of labour involved received very little consideration. He has given not only the terms used in the various coal mining districts of Great Britain, indicating the exact locality in which they are employed, but has likewise furnished terms used in Prussia, France, and the United States; whilst, to make the work still more valuable, he has, wherever necessary, illustrated the apparatus or mode of working described. The glossary is one which should be found in every colliery office, and a book which to the young colliery engineer will prove invaluable.

**LOADING COAL WITHOUT BREAKAGE.**—Some improvements in shoots, applicable more especially for loading coal, ore, and other materials into the holds of vessels, have been patented by Mr. S. W. SNOWDEN, of West Hartlepool. For this purpose he hinges the upper ends of one or more troughs or shoots to a block or table, which may either be supported by standards or suspended over the hatchway of a vessel. The table carries above it a hopper into which coal or other material is received and guided on to the shoots. Each shoot is made telescopic, so that it may be drawn out to the length required. The lower portion of each shoot is held up by a chain passing to a barrel carried by the upper end of the upper portion of the shoot—the barrel has upon it a worm wheel which can be turned by a screw gearing with it so that by turning the screw the barrel can be made to wind up more or less of the chain, and the shoot can so be brought to the length required. Usually he employs two shoots hinged to opposite sides of the block which carries the hopper. He

connects the lower part of the upper divisions of each of the two troughs by links to a nut through which is screwed a screw rod. The screw rod projects downwards from the centre of the table or block, and when the screw is turned the nut will travel upwards or downwards along the screw. When the nut is at the lower end of the screw, the links jointed to its opposite sides are horizontal, or nearly so, and the troughs or shoots held in positions inclining outwards away from one another. When the nut is moved upwards the links are carried into an inclined position approaching the vertical, this draws together the lower ends of the two shoots until the shoots both hang down vertically or nearly so—when the shoots are so closed together they may be lowered through the hatchway of a vessel or other opening, and when so lowered may then be opened out away from one another so as to bring them to the angle required. When the apparatus is done with, the troughs or shoots are again closed together, and can then be drawn up through the hatchway or opening.

#### METHODS OF REDUCTION FOR COPPER ORES.

From a very able and exhaustive article in a recent number of the Mining and Scientific Press of San Francisco, the representative Mining Journal of the Pacific Coast of the United States of America, upon the early history, uses, and production of copper, under the above heading, we make the following extract:—

"In the reduction of copper ores various systems have from time to time been adopted, the method being subject in part to the character of ore worked and general existing conditions. For many years the business of smelting copper ores has been carried on almost exclusively at Swansea, South Wales, near the mines of Cornwall and Devon, ores being shipped to this point from all parts of the world. Until the past decade but little was known of the great resources of the Pacific States and Territories in copper. Some developments had been made in various parts of the country of a most promising nature, and much money spent in reduction works, based upon former methods of working, but the attempt to introduce the systems and practice of the old world into the new, in this as in many other things, was attended with disastrous failure. The new conditions were not suited to the old order of things. In this emergency Messrs. Rankin, Brayton, and Co., of the Pacific Ironworks, in this city, a firm representing the most advanced ideas of modern practice in everything relating to the mechanical appliances for treating ores, conceived the idea of applying the principle of the Water Jacket Furnace to the reduction of ores, and instituted a series of experiments, with a view of determining what form of jacket was best adapted for the purpose, as well as the mechanical construction necessary to withstand the severe ordeal that such work would be subjected to. After some years of persistent and costly experiments, a result was reached which has made a revolution in the methods of copper reduction, and which has created an industry that has been a source of vast increase to the wealth of the country. It is no exaggeration to say that the extraordinary development of the copper interest in all our mining States and Territories owes its origin and present progress to the invention and general introduction of the Pacific copper smelter. This furnace has revolutionised all former methods, and made practicable the treatment of all classes of copper ores by a single process, so simple in operation and so economical in results that there is scarcely a copper mine anywhere, located favourably as to fuel and transportation, that cannot now be profitably worked. Every successful copper enterprise in the country, without an exception, we believe, is being operated by this method of reduction. The manufacturers are now receiving orders for their smelters from nearly every mining country in the world, and the system seems likely soon to become universal. The same system of reduction, it may also be said, has been applied with equal success to all grades and classes of galena ores."

#### MANUFACTURE OF METALLIC SODIUM.

Up to the present the commercial production of metallic sodium and of the cyanides by fixing atmospheric nitrogen has been performed in apparatus such as tubes, retorts, and crucibles, in which are placed the alkaline composition and the carbon or other composition; and these tubes, retorts and crucibles are placed in furnaces and heated by heat applied externally; but in the process of manufacture patented by Mr. C. A. FAURE, of Paris, he also employs the method of external heating, but only to raise the material to a moderate temperature relatively to the high temperatures necessary to obtain the desired decompositions and effects, which he effects by other means. The principal means consist in the application of the heat of electric arcs, currents, or discharges, by means of which he can obtain a temperature which, having no theoretical limit and being applied directly to the alkaline matter, permits him to operate rapidly and consequently economically.

A metallic casing supports the structure. Upon it there is a block or lump of very refractory brick. There is also a cavity like that of a draw furnace and with an opening at the bottom corresponding to a like opening in the casing. A metallic tube forms a continuation of the cavity, and is closed by a moveable cover at the upper part; in this tube the materials to be treated are placed, a flue or jacket almost completely envelopes the metallic tube, and there is a fire-gate where heat is developed, which passing to the flue or jacket heats the tube and the matters which it contains a lateral passage from the cavity intended to lead the vapours produced during the reaction to suitable condensers placed outside. There is a grating in the form of a drum placed at the bottom of the cavity and worked from the outside; by turning it upon its axis the carbonaceous matters are evacuated after treatment from the bottom of the cavity, radial openings are pierced in the block or lump, and electrodes or pencils of carbon or iron or other proper material are suitably adjusted in orifices to slide longitudinally as the resistance to the electric current demands.

It will be seen that the matters contained in the metallic tube, which are already heated by the heat of any combustible solid liquid or gaseous burnt in the grate on their arrival in the cavity are by the electric arc or by the passage whatever it may be of the current brought under the influence of an additional very high temperature. The operation is semi-continuous as in a draw furnace, such as a limekiln. After having charged by the upper orifice of the tube this is closed by means of its cover or stopper. The lower casing is also hermetically closed, so that the vapours which result from the operation have to pass by the discharge passage to the condenser mentioned above.

To aid this movement the inventor sometimes introduces at the bottom and top a gentle current of a suitable gas adapted to the product which it is desired to obtain; thus he sends oxide of carbon or hydro-carbon gas if he treats an alkaline matter with the object of obtaining the alkaline metal, and he sends in principally nitrogen gas, if he desires to obtain a cyanide. Sometimes he dispenses with the heating tube, and sometimes the furnace cavity is arranged for alternate and discontinuous operations. The movement of the electrodes is generally automatic, and regulated by the passage of the current itself by the well-known use of electro-magnet bobbins, which being traversed by a small part of the current permit a movement of the electrodes co-ordinated with this movement.

**SUCCESSFUL MINING ON LAKE SUPERIOR.**—An American paper says:—The dividends of five Lake Superior copper mines, since Jan. 1, 1883, aggregate \$2,190,000. The total capital stock of these five companies—Atlantic, Calumet, and Hecla, Central, Okeola, and Quincy—\$6,520,000, and the paid-up capital of these is \$3,160,853: The dividends so far declared, for this year alone, amount to 35 per cent. on the entire capital of the stock, and to 50½ per cent. on the capital paid in.

**CITY AND DISTRICT BANK.**—A petition for winding-up this company is to be heard on Sept. 5.  
Mr. Justice Pearson has appointed Mr. William Waddell provisionally official liquidator of the Duplex Electric Light Power and Storage Company.



THE COAL FIELDS OF NEW ZEALAND.

It has already been mentioned that the mineral resources of New Zealand were brought prominently to the notice of the Liverpool Geological Association, in a paper by the President—Mr. Henry Bramall, M.I.C.E., and an opportunity may now be taken to give an outline of the information which he furnishes with regard to the coal fields of that province, and it is gratifying to find that these appear to be capable of development to an extent which will amply supply the requirements of its home industries. Mr. Bramall is, of course, only able to give, as he says, a rapid and cursory glance at the very interesting geological structure of New Zealand; and the author can only give such a slight outline of these features as will enable him to be more easily understood when treating of the more immediate subject of his paper. The fundamental rocks are the crystalline schists, foliated and contorted gneiss, occurring in the south-west of Otago. They constitute huge mountains, intersected by deep ravines, the sides precipitous, often almost perpendicular. On the west these ravines are occupied by arms of the sea corresponding to the fiords of Norway, and, like them, they are often of great depth, and deeper at the head than at the entrance. Similarly the ravines on the east hold fresh water lakes of great depth, the bottoms being usually much below sea-level. True granites—grey, white, and flesh colour—syenites and diorites are associated with these rocks. These are succeeded by an immense series of metamorphosed foliated schists, which cover the larger part (probably more than 8000 square miles) of Otago, and extend along the west coast of the South Island through Westland and Nelson to the neighbourhood of Collingwood. They have not yet been found in the North Island. The lower members of the series are contorted schists, foliated with quartz, and overlying these, in a few localities where they have escaped denudation, are soft, blue, micaceous slates, containing quartz veins in a friable and decomposing condition. Upon these formations are situated all the important alluvial gold fields of the South Island, and it is generally conceded that the gold has been derived from the numerous strings and veins of quartz by which they are traversed. The age of these altered beds has not yet been satisfactorily determined; they are probably silurian, but some may be older, and, on the other hand, others may be much younger, possibly carboniferous.

The lowest unaltered rocks yet described are of silurian age, and occur in the north-west of Nelson, consisting of schists and crystalline limestone; while the Devonian is represented by the quartzites and limestone beds of Reefton. Flanking the belt of foliated schists which runs through the South Island is a great mass of slates and limestones, greenstone breccias, and sandstones, extending from the northern part of Otago, through Canterbury, Marlborough, and Nelson, and again from Wellington almost continuously to the East Cape; while detached masses occur at the Coromandel Peninsula, along the coast north of Wangarei, at the North Cape, and several other localities. Pitched at high angles, these rocks constitute the chief mountain ranges of both islands, rising to great elevations, in Mount Cook even to 13,200 feet, their tops bold, rugged, and serrated. These beds are probably of lower carboniferous age, and are of great interest from their frequently holding important mineral deposits. Passing over the permian (?) trias, and lias, all of which are represented, we pause to remark that the jurassic beds in many places contain small and irregular coal seams, but as yet have yielded none of commercial value. The neocomian is probably represented by the sandstones, conglomerates, and grits with which are associated the valuable bituminous coal seams of the West Coast.

The formation to which Dr. Hector has applied the name "cretaceous-tertiary," from its fossils presenting, to some extent, both tertiary and mesozoic features, is widely distributed. In its upper part it consists of marls, sandstones, greensands, limestone, chalk marls, and chalk with flints, and is of marine origin. At its base lies the black grit, and, in certain localities, the coal formation in which the principal workable hydrous Brown coal seams are found. The fossil plants associated with the coal deposits are ferns, and, according to Dr. Hector, "remains of dicotyledonous and coniferous trees of closely allied species to those represented in the existing flora of the country." In this appears that nearly the complete geological sequence of formations known in Europe has already been identified in New Zealand, the gaps remaining to be filled being chiefly in those archaic rocks found in the mountainous, almost unknown, and scarcely accessible regions of the south-west; these are, at present, but roughly grouped, chiefly from their mineralogical characteristics.

It is noticeable that the general strike of the rocks of the older formations has a north-east and south-west direction, which, as Dana points out, corresponds with the line of elevation in the Pacific Ocean, the same general effect being observed on the East Coast of Australia. This line of elevation also corresponds with the general lines of plutonic and volcanic outbursts, which extend along the eastern foot of the mountain ranges of the South Island and the western foot of those of the north. It is crossed, nearly at right angles, by a line of depression, originating the transverse ruptures to which are due Foveaux and Cook's Straits and the north-east coast line of the north island. The important part played by volcanic agencies in the formation of the country is seen in the tuffaceous breccias and lava flows, which cover so large a part of the surface; fully one-third of the area of the north island being occupied by these deposits. And that these forces are even now not quite extinct is evidenced by the smouldering cones of Ngauruhoe and White Island and the hot springs of the Geyser district; while old Vulcan, by an occasional gentle earthquake, reminds the inhabitants of his near presence.

The mineral resources are rich and varied, and though as yet but imperfectly explored, as we may easily suppose when we remember that the country is as large as Great Britain, and the population less than that of Liverpool; still enough has already been discovered to indicate the future development of immense wealth. No true palaeozoic coal has yet been found in New Zealand, all the seams known are of late mesozoic or tertiary age, and of the kind usually termed by geologists Brown coal; yet the varieties of quality range from lignite, but little removed from peat to coal, which in appearance and composition cannot be distinguished from true anthracite, these variations chiefly resulting from purely local causes, such as the contact or proximity of volcanic dykes or flows, which have deprived the hydrous coals of more or less of their water. The varieties may be thus roughly classed:—Lignite, woody structure, 15 to 30 per cent. water; Brown coal, compact structure, 10 to 20 per cent. water; pitch coal, conchoidal fracture, water usually under 10 per cent.; bituminous or coking coal, laminated and cuboidal, water less than 5 per cent.; and anthracite, very dense and compact, practically anhydrous.

The North Auckland coal field extends from south of Wangarei to near the Bay of Islands, a distance of more than 30 miles. The field is bounded on the east by palaeozoic slates and sandstones, and in the hollows of these rocks lie the beds of the cretaceous-tertiary formation, at the base of which are the coal seams. Near Wangarei Harbour these beds cover an area of about 16 square miles, with two seams of coal, the upper  $4\frac{1}{2}$  ft., and the lower or main seam 6 ft. to 10 ft., thick. The coal is pitch coal of good quality, and is worked at the Whau-Whau and Kamo Collieries. Northerly from Kamo the surface is chiefly covered by basaltic and trachytic rocks for about 9 miles from Hikurangi, where numerous outcrops of seams have been noted, varying from 2 ft. to 6 ft., but none have yet been worked. Further north the country is chiefly slates with tracts of overlying volcanic rocks to Kawa-Kawa, where a basin-like area of coal measures occurs, consisting of a series of green and brown sandstones and limestones, containing two seams of coal, the upper being 4 ft. 3 in. thick, of inferior quality. The lower or main seam is from 6 ft. to 15 ft. thick pitch coal, hard, compact, and of good quality, and is now worked by the Bay of Islands Coal Company. A notable point about this coal is the large amount of sulphur it contains, stated at about 5 per cent., not, as is commonly the case, in the form of pyrites, but the greater part oxidised as free sulphuric acid, which is even said to communicate a sour taste to the coal. The total area of this basin is estimated at 10 square miles. North from Bay of Islands the country is chiefly volcanic, but at the head of Wangarei Harbour a seam of Brown coal is found outcropping among green

sandstones. Still more north at Mongonui coal outcrops are known to exist. Dr. Hector, in 1865, received a specimen of shale resembling torbanite from this district, which contained 75 per cent. volatile matters; but "no other specimen was found," and although Mr. McKay visited and searched the locality in 1875 he failed to find the deposit. It is needless to remark how valuable a workable bed of this mineral might prove if found in an accessible position.

In the Coromandel peninsula small deposits of Brown coals have been found at several points, and quite recently a bed of excellent bituminous coal is reported from Tiarao. In the South Auckland or Waikato coal field, so far back as 1859, a coal seam about 6 ft. thick was opened at Drury, 20 miles south of Auckland; but the coal was inferior, crumbling on exposure and the irregular floor of clay. Bad roof and costly freight caused the works to be abandoned after four or five years, and they have since remained closed. The coal basin of the Lower Waikato extends from Mercer southwards to Taupiri about 35 miles, with a breadth of probably about 20 miles. The basement rocks of the country are palaeozoic slates of undetermined age, very pyritous, and much disturbed, and which rise into a range of hills extending from near the Firth of Thames by Taupiri to near Waipa, and form the eastern and southern boundary of the coal basin. Upon their flanks and hollows repose a series of shales and sandstones with coal seams, supposed to be of lower greensand age, and these are in turn overlaid by the Leda marls, the lowest beds of the cretaceous tertiary formation. The whole suggests the site of an ancient estuarine lagoon. On the east, within seven or eight miles of the Thames Gulf, a shaft was sunk at the Bridgewater Colliery, the measures passed through being—Leda marls and fire-clay, 17 ft.; sandstone, 2 ft.; Brown coal, 55 ft.; shale, 2 ft. The coal is good, but the venture has not been successful, and the colliery is now closed. Near Taupiri Gorge in the south, at the Taupiri Colliery, the coal is 31 ft. thick, divided by a shale band; and at the Kupa-Kupa or Waikato Colliery the seam is from 18 to 23 ft. Both these collieries are working, and help to supply Auckland City. It is estimated that not less than 150 million tons of coal are available in this district. At other points on the west and north-west outcrops of coal seams are known; but, partly owing to the objections of the natives, the district has not yet been fully examined. There appears at least strong presumptive evidence that coal will be found to underlie the greater part of the lower Waikato basin. South of the Waikato field, on the River Mokuau, outcrops of seams 2 ft. to 6 ft. thick, have been examined by Dr. Hector, who reports them to be pitch coal of good quality, and probably of lower greensand age. The densely wooded nature of the country, which is in the hands of the natives, prevented the extent of the outcrops from being traced; but these were found at several miles apart. Brown coal has been found in the province of Wellington on the Wanganui and Rangitikei Rivers.

The Nelson or West Coast coal fields in the South Island are, perhaps, the most important in the colony. They occur as detached deposits in the hollows of the older rocks, and extend from West Wanganui to Grey river about 150 miles. On the older rocks lie the sandstones, shales, and coal seams of lower greensand age, overlaid by the cretaceous-tertiaries. At Collingwood there are four seams of excellent bituminous coal from 3 to 4 ft. in gross thickness, but so mixed up with shale partings that the working of them has been repeatedly abandoned. At several points in the vicinity good outcrops are known. At West Wanganui inlet a 4-foot seam has been worked, but unsuccessfully. The Buller coal field extends from the Mokihini to the Buller, about 40 miles, with a maximum breadth of 7 miles. The country is broken and rough. Rising from the Buller River by a succession of terraces at an elevation of from 1500 to 2500 ft. is a great bare plateau sloping gently to the north-east, descending to sea-level near the Mokihini. Intersecting this plateau are well-timbered, deep, precipitous gorges, on the sides of which are exposed sections of the coal seams. Of these there are two—an upper very irregular one of 1 ft. to 5 ft. thick, and a lower—the main seam—ranging from 8 ft. to 53 ft. thick. The quality varies in different parts, from a tender bituminous coking coal to a splint or Cannel coal. Several attempts have been made to work this field, but not with very satisfactory results. Recently, however, the Westport Coal Company has opened a colliery which gives good promise. The quantity of coal available is estimated at one hundred and five million tons. The Buller river is the best port of the West Coast, and is capable of being greatly improved, and as the coal seams on the plateau are thick, compact, and of superior quality, and can be won in most cases by level drives, the difficulties of transport will eventually be overcome, and, with the judicious employment of capital and technical skill, there ought to be a good future before this district.

The Grey coal field, about 7 miles above the mouth of the River Grey, extends about 15 miles north and south. There are several seams, the principal one being 12 to 16 ft. thick of bituminous coking coal, overlaid by sandstones, and having a fire-clay seat. This coal is probably the best coal in Australasia. There are working here the Brunner, the Coal Pit Heath, and the Wallend Collieries. Defective transport and a shifting bar at the mouth of the Grey River, which limits vessels to a draft of 9 or 10 ft., are obstacles which have hitherto retarded the development of coal mining in this field, which is estimated to contain about four million tons of available coal. Refton is a gold mining town on the Inangahua river, east of Grey, where seams of pitch coal from 6 to 21 ft. thick are found and worked on a small scale for local use.

Some Brown coal beds found at Nelson City have led to many unsuccessful attempts to work them, and at Picton also many trials have been made which have ended in disappointment. Recently a seam has been found at the head of Shakespeare Bay which promises better, and a company has been formed to work it. At Kanieri,

in Westland, some coal crops are found which have lead to considerable sums being spent in prospecting trials, but no payable seams have been proved. Further south, from near Paringa river to Moore river, a district extending north to south 25 miles by about eight miles wide, is occupied by coal measures, and an outcrop of good bituminous coal 12 ft. thick has been traced between three and four miles. At Jackson's Bay, Cascade Point, and Martin Bay extensive areas of coal measures are known to exist, but they have not yet been sufficiently examined to justify an opinion as to the value of the seams they contain.

The Malvern Hills coal field, about 30 miles west of Christchurch, comprises a district of about 180 square miles. The beds of the great Brown coal formation lie along the east slopes of the hills, and descend towards the plains, beneath which they appear to dip. They consist of sands and shales, with several seams of coal, the thickest of which, however, is only  $7\frac{1}{2}$  ft. The district has been extensively disturbed and broken by dykes of trachytic porphyry, and subsequently subjected to enormous denudation in the post pleiocene glacial period. In the western parts only isolated patches of altered coal remain where basalt cappings have preserved the subjacent beds. The dykes and streams of lava have converted the coal within reach of their influence from Brown to pitch, or glance coal, and in some cases, as at Acheron Gorge, to anthracite. There are several collieries working in this field, and the whole available coal is estimated by Dr. Haast at something under 5,000,000 tons. At Clent Hills and Mount Somers are coal seams, but they are of purely local importance. At Oamaru two seams of Brown coal, each 9 ft. thick, are worked on a small scale.

The coal measures at Shag Point flank the Horse Ranges, and consist of several thousand feet of conglomerates, sandstones, and shales. The uppermost beds of the series extend about one and a half miles along the coast by about a quarter of a mile wide, and contains valuable coal seams, estimated to yield about 1,000,000 tons, and which are seen outcropping in the precipitous cliffs. The Shag Point Colliery works a seam of pitch coal 7 ft. thick, which is followed to the deep under the sea. Green Island coal field, near Dunedin, has an area of about eight square miles. The measures lie in a hollow of the older slates, and have been preserved from denudation by the basalt and dolerite flows which cap the adjoining hills. There are five seams, but only one is worked, varying from 13 to 19 ft. in thickness, of inferior hydrous Brown coal. The roof is bad, so that only 7 to 10 ft. of the seam is worked. There are five collieries, and the contents of the field is computed at 28,000,000 tons. The Clutha and Tokomairiro coal field covers about 40 square miles. The measures consist of conglomerates, sandstones, and clay shales, with several seams of Brown coal, and form a range of hills between the Kaitangata Lake and the sea coast, along which they are seen in sections for three miles. The seam worked at Kaitangata is from 24 to 30 ft. thick, of which from 20 ft. to the full thickness is got. The field is estimated to contain 150,000,000 tons.

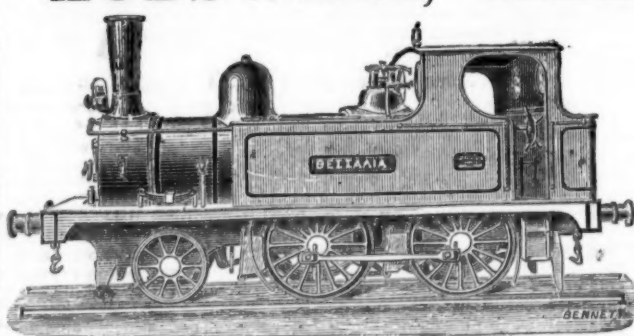
In Southland and the south and west of Otago a considerable extent of surface is occupied by beds of the cretaceous-tertiary and jurassic formations, and outcrops of coal have been found at many points, but the seams have mostly been too thin for profitable working. At the Nightcaps, Otago, a seam of pitch coal  $5\frac{1}{2}$  ft. thick is being got on a limited scale, and at Mataura lignite 12 ft. thick has been worked for some years. Lignite deposits are found in many parts of Southland and Otago. Usually they occur in what are evidently old lake basins, in the surface of the slate rocks in the interior. They are often of great thickness, and owe their origin to driftwood; fragments of trees are common, in which the woody tissue is perfect, the most usual being a species of fagus—the birch of the colonists. These deposits are of quite recent tertiary age, being usually covered only by brick clays, gravels, silts, or shingle. The lignites not uncommonly contain resinous matter (retinite) in considerable quantity, when they burn very readily; where this is absent, or only present in very limited quantity, they burn slowly, smouldering like turf, giving off a disagreeable foetid odour, and leaving a large quantity of light ash. They are worked at numerous points, usually as opencasts and on a very limited scale, and, where better fuel is scarce and costly, they prove very useful for local requirements.

From these notes it will be seen that coal seams are widely distributed through both islands, and no parts except the east of the north and the north-east of the South Islands are very distant from workable coal. A noteworthy point, as compared with British coal fields, is the limited vertical depth of measures to which good coal seams are confined, and most of the areas contain only one good workable seam. In a new and imperfectly explored country the necessary data for estimating this are very incomplete. It appears that in known areas an available supply of 450,000,000 tons has been ascertained. Any computation of the duration of this supply would, in the present state of the colony, be little more than a wild guess. The local consumption of coal in 1881 was in Great Britain 3.67 tons, and in New Zealand 86 tons per head of population. But the increment in population and the development of industries in the two countries are so dissimilar as to preclude the founding of any estimate on this basis.

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The following joint-stock companies have been duly registered:—

**THE COLCHESTER TRAMWAYS COMPANY (Limited).**—Capital 60,000*l.*, in shares of 2*l.* To construct, lay down, equip, maintain and work tramways in said town and neighbourhood. The subscribers are—R. G. Elmes, 7, Westminster Chambers, 100; S. Grant, Brigg, 100; W. G. Grove, Bideford, 100; W. F. Nuthall, Baron's-court, 100; W. C. Chambers, 3, Westminster Chambers, 10; A. G. Fenn, Dashwood House, 10; G. F. Rendall, 66, Finsbury Pavement, 10.

**THE CONTINENTAL MAXIM-WESTON ELECTRIC COMPANY (Limited).**—Capital 500,000*l.*, in shares of 10*l.* To light thoroughfares, streets, public and other buildings, manufactories, mines, &c., on the Continent of Europe and elsewhere. The subscribers (who take one share each) are—E. M. May, 3, Upper Avenue-road; H. S. Maxim, Clapham; N. de Kabatt, 47, Cannon-street; H. Watt, 93, Leadenhall-street; J. Brown, 3, Aubrey-road; J. B. Cox, 93, Leadenhall-street; W. R. Blogg, Gresham House.

**THE CORYTON UNITED MANGANESE COMPANY (Limited).**—Capital 60,000*l.*, in shares of 1*l.* To buy, lease, or otherwise acquire and work manganese and other ores, whether in mines, pits, or quarries; and also mining property, rights, and powers in the counties of Devon and Cornwall, or elsewhere. To carry on all kinds of mining operations, manufacturing, and selling manganese and all other ores. The subscribers (who take one share each) are—G. J. Nicholls, 62, Portnall-road, clerk; H. Wilson, 86, Portsdown-road, no occupation; G. R. Hearn, Selhurst, clerk; C. C. Baker, Clapton, clerk; F. W. Beeby, Stratford, clerk; T. Miller, Brixton, publisher; E. J. Hearn, Selhurst, clerk. The following are the first directors:—C. Clark, H. Finin, W. Martineau, H. Wilson, and H. Martin. Qualification, the holding of 200 shares.

**THE UNITED CAMBRIAN COPPER MINING COMPANY (Limited).**—Capital 25,000*l.*, in shares of 1*l.* To purchase or otherwise acquire, develop, and work mines, minerals, and mining rights, lands, &c., in the Principality of Wales, and in particular the lands, mineral, and mining rights known as the Cambrian Mine, situated near Talybont, Cardiganshire, with the ore-houses and other buildings erected on the said land, and the engineering and other plant, machinery, stock, implements, and effects used in or belonging to this mine, for the purpose of carrying on the usual business of a mining company in all branches. The subscribers (who take one share each) are—C. E. Solomon, Dartford, clerk; T. Semper, 14, Queen Victoria-street, mining contractor; W. S. Morley, Lewisham, gentleman; F. W. Dunnaway, 19, Applegarth-road, clerk; E. Griffiths, Hornsey, accountant; J. Rivolta, West Kensington, merchant; F. W. Flanagan, 101, Cannon-street, cashier.

**THE AUSTRALIAN PYRITES SMELTING COMPANY (Limited).**—Capital 120,000*l.*, in shares of 5*l.* To acquire by purchase or otherwise any inventions, patents, &c., for the treatment of ores, pyrites, and minerals generally, and to deal in and dispose of ores, minerals, and metals. The subscribers (who take one share each) are—S. Green, 239, Brompton-road, gentleman; R. F. Webb, Cromwell-road, lieutenant-colonel; C. R. Dawson, Ealing, gentleman; E. C. Koch, 38, Threadneedle-street, stockdealer; A. H. Koch, 38, Threadneedle-street, secretary; J. E. C. Koch, 107, Philbeach Gardens, gentleman; S. Pixley, 37, Old Broad-street, bullion broker.

**JOHN LENN AND COMPANY (Limited).**—Capital 20,000*l.*, in shares of 100*l.* and 1*l.* To acquire and continue an established business of stock and share dealers and brokers. The subscribers (who take one share each) are—S. G. Hinton, 5, Grocer's Hall-court; T. H. Cubitt, 36, King-street; J. T. Rolfe, Stratford; L. W. Hinton, Poplar; W. Filton, Poplar; P. B. Hooff, Woodford; W. H. Lipsay, Hackney.

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**NORTH WESTMORLAND LEAD MINING COMPANY (Limited).**—Capital 7000*l.*, in shares of 1*l.* To purchase for the residue of the term of 21 years the mines of lead and barytes under certain lands situated in the manors of Brough and Stainmore, Westmorland, and the rights and privileges related thereto, for the purpose of carrying on in all branches the business of a lead mining company. The subscribers are—F. E. Armstrong, Newcastle, accountant, 158; G. Reed, Haydon Bridge, farmer, 94; J. Brown, Haydon Bridge, lead ore dresser, 60; J. W. Hetherington, Haydon Bridge, C.E., 75; A. Bell, Brough, contractor, 60; W. Williams, Brough, mining contractor, 60; T. Martin, Brough, mining engineer, 75. The following constitute the first board—F. E. Armstrong, G. Reed, J. Brown, A. Bell, W. Williams, T. Martin, G. Bramwell, and M. Mews.

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**HAMBURG, ALTONA, AND NORTH-WESTERN TRAMWAYS COMPANY (Limited).**—Capital 100,000*l.*, in shares of 10*l.* To construct, equip, maintain, and work a system of tramways in said town and neighbourhood. The subscribers (who take one share each) are—H. Duncan, 38, Cornhill; H. Swanson, Brixton; E. M. Frere, Isle of Wight; W. A. Barron, Richmond; S. C. Burleigh, 8, Suffolk-lane; E. Neave, Dresden; H. B. Flowden, Richmond.

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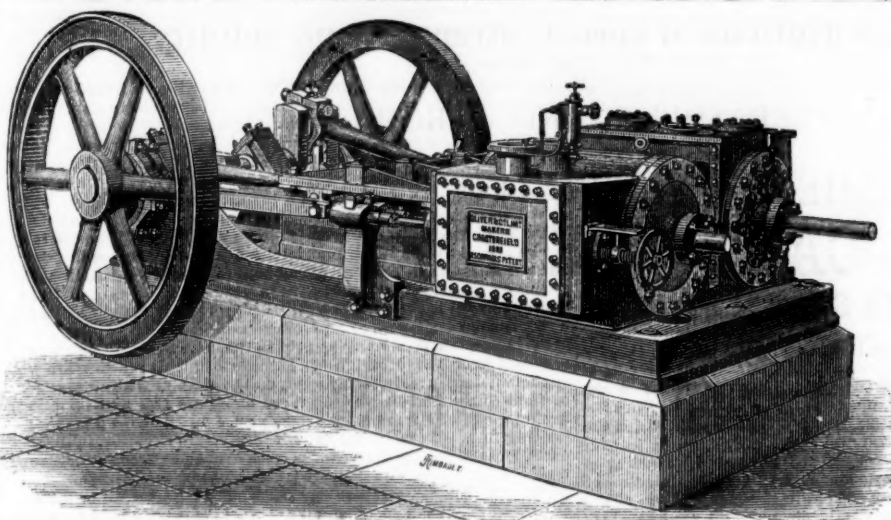
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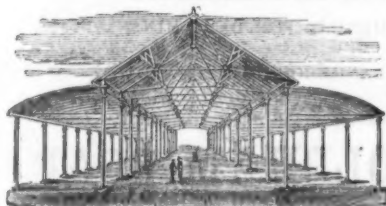
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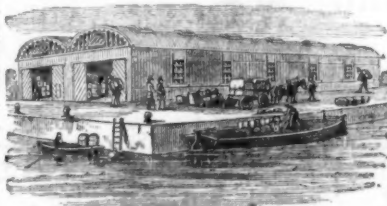
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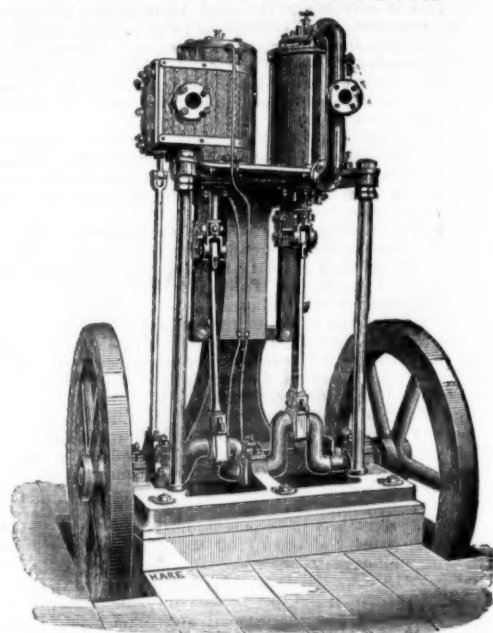
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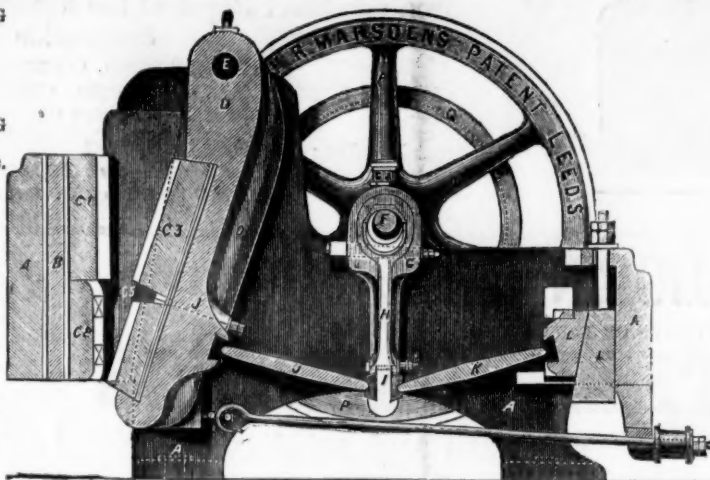
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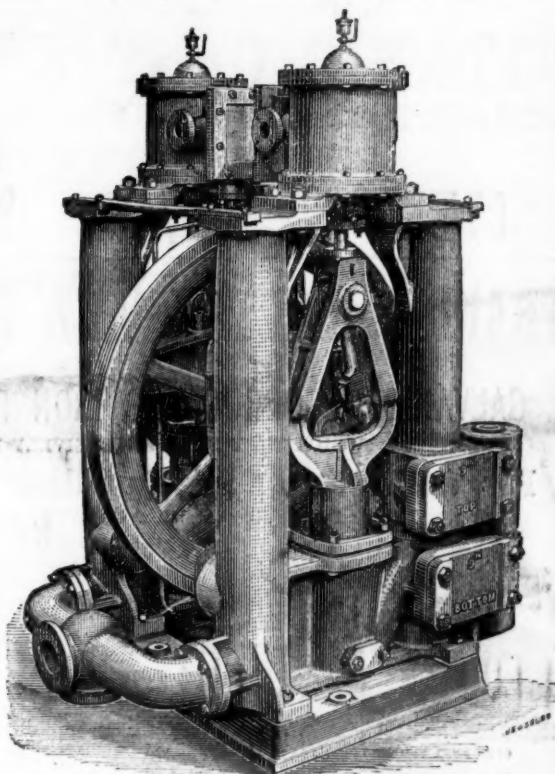
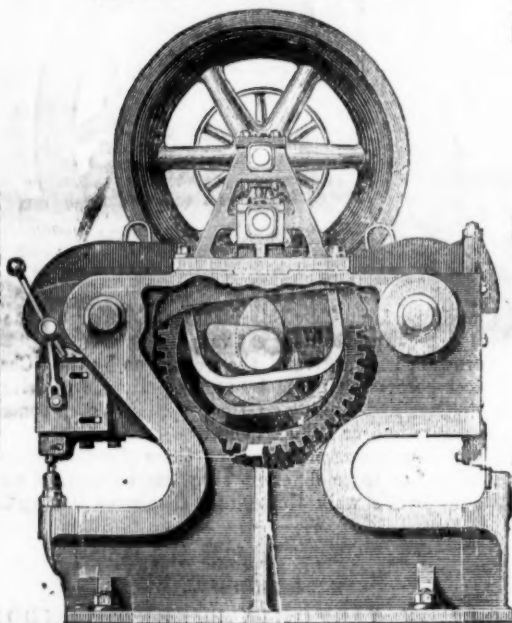
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